

# MAPPING INVESTIGATIONS AND CASES IN MISP

E.205

CIRCL COMPUTER INCIDENT RESPONSE CENTER LUXEMBOURG

MISP PROJECT

<https://www.misp-project.org/>

MARCH 30, 2022 - VO.7



2022-03-30

Mapping investigations and cases in MISP

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# OBJECTIVES OF THIS MODULE

- Recap on MISP data model and distribution levels
- Data from cases to be structured and encoded:
  - ▶ **Network indicators:** ip, domain, url, ...
  - ▶ **Files and binaries:** non-malicious / malicious payload
  - ▶ **Emails:** content, header, attachment, ...
  - ▶ **Web:** URL, cookies, x509
  - ▶ **Cryptographic materials:** public / private key, certificate
  - ▶ **Infrastructure and devices**
  - ▶ **Financial fraud:** bank-account, phone-number, btc
  - ▶ **Person:** name, online accounts, passport, visa
  - ▶ **Support tools:** yara, detection/remediation scripts
  - ▶ **Vulnerabilities:** cve
  - ▶ **External analysis:** Reports, blogpost, ransome notes
- Relationships and timeliness
- Enrichments via module and correlation
- Preparing data for sharing with other LE partners, CSIRT, SOC

2022-03-30

## Mapping investigations and cases in MISP

### Objectives of this module

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# MISP DATA MODEL AND DISTRIBUTION LEVELS

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Mapping investigations and cases in MISP  
└─ MISP Data model and distribution levels

MISP DATA MODEL AND DISTRIBUTION  
LEVELS

## Event



*Encapsulations for contextually linked information.*

**Purpose:** Group datapoints and context together. Acting as an envelop, it allows setting distribution and sharing rules for itself and its children.

**Usecase:** Encode incidents/events/reports/...

- events can contain other elements such as attributes, objects and eventreports.
- The distribution level and any context added on an event (such as taxonomies) are propagated to its underlying data.

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Mapping investigations and cases in MISP

└ MISP Data model and distribution levels

└ MISP Event

## Event

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## Attribute

*Basic building block to share information.*

**Purpose:** Individual data point. Can be an indicator or supporting data.

**Usecase:** Domain, IP, link, sha1, attachment, ...

- ▶ attributes cannot be duplicated inside the same event and can have sightings.
- ▶ The difference between an indicator or supporting data is usually indicated by the state of the attribute's to\_ids flag.

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Mapping investigations and cases in MISP

└ MISP Data model and distribution levels

└ MISP Attribute

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▶ The difference between an indicator or supporting data is usually indicated by the state of the attribute's to\_ids flag.

## MISP Object

*Advanced building block providing attribute compositions via templates.*

**Purpose:** Groups attributes that are intrinsically linked together.

**Usecase:** File, person, credit-card, x509, device, ...

► objects have their attribute compositions described in their respective template. They are instantiated with attributes and can reference other attributes or objects.

► MISP is not required to know the template to save and display the object. However, *edits* will not be possible as the template to validate against is unknown.



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Mapping investigations and cases in MISP

└ MISP Data model and distribution levels

└ MISP Object

MISP Object

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## Object Reference



*Relationships between individual building blocks.*

**Purpose:** Allows to create relationships between entities, thus creating a graph where they are the edges and entities are the nodes.

**Usecase:** Represent behaviours, similarities, affiliation, ...

► references can have a textual relationship which can come from MISP or be set freely.

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Mapping investigations and cases in MISP

└ MISP Data model and distribution levels

└ MISP Relationships (aka object reference)

### Object Reference

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**Purpose:** Allows to create relationships between entities, thus creating a graph where they are the edges and entities are the nodes.

**Usecase:** Represent behaviours, similarities, affiliation, ...  
► references can have a textual relationship which can come from MISP or be set freely.

## Event Report

*Advanced building block containing formatted text.*

**Purpose:** Supporting data point to describe events or processes.

**Usecase:** Encode reports, provide more information about the event, ...

► Event reports are markdown-aware and include a special syntax to reference data points or context.

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Mapping investigations and cases in MISP

└ MISP Data model and distribution levels

└ MISP Event report

### Event Report

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**Purpose:** Supporting data point to describe events or processes.

**Usecase:** Encode reports, provide more information about the event, ...

► Event reports are markdown-aware and include a special syntax to reference data points or context.



Which structure should be used when encoding data?

## ■ Attribute vs Object

- ▶ If the value is contextually linked to another element or is a subpart of a higher concept, an **object** should be used
- ▶ If the value is part of a large list of atomic data, an **attribute** should be used

## ■ Annotation Object vs Event Report

- ▶ If it is possible to encode the text (raw text or markdown), an **event report** is preferred
- ▶ If the text is written in a specific format (e.g pdf, docx), an **annotation object** should be used

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Mapping investigations and cases in MISP

└ MISP Data model and distribution levels

└ General rule of thumb

Which structure should be used when encoding data?

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# CASE STUDY 1: SCAM CALL

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Mapping investigations and cases in MISP

└ Case study 1: Scam call

CASE STUDY 1: SCAM CALL

## CASE STUDY 1: SCAM CALL

**Case:** A victim was asked to transfer money to a novice scammer

### Chronology - 2022-03-24

**11:42:43 UTC+0:** Scammer called the victim pretending to be a microsoft employee

**11:47:27 UTC+0:** Scammer convinced the victim to be helped via remote desktop assistance

**12:06:32 UTC+0:** Scammer downloaded the binary on the victim's computer

**12:08:18 UTC+0:** Scammer installed the binary on the victim's computer

**12:17:51 UTC+0:** Scammer asked the victim to transfer money on a bank account for the help he provided

**12:25:04 UTC+0:** Victim executed the money transfer

**2022-03-25 08:39:21 UTC+0:** Victim contacted police

## Mapping investigations and cases in MISP

└ Case study 1: Scam call

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2022-03-30

**Case:** A victim was asked to transfer money to a novice scammer  
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12:25:04 UTC+0: Victim executed the money transfer  
2022-03-25 08:39:21 UTC+0: Victim contacted police

## Collected evidences

- ▶ RDP Log file
- ▶ Installed binary
- ▶ Victim's browser history
- ▶ Bank account statement
- ▶ Victim's phone call log

## Data extracted from evidences

- ▶ Scammer's **ip address**
- ▶ Potentially **malicious binary**
- ▶ **URL** (and **domain**) from which the binary was downloaded
- ▶ Scammer's **bank account** and **phone number**
- ▶ Scammer's full name and nationality

### Collected evidences

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- ▶ Scammer's **ip address**
- ▶ Potentially **malicious binary**
- ▶ **URL** (and **domain**) from which the binary was downloaded
- ▶ Scammer's **bank account** and **phone number**
- ▶ Scammer's full name and nationality

## Extracted values

- ▶ 194.78.89.250
  - ip-address from log file
- ▶ bin.exe
  - downloaded binary
- ▶ https://zdgyot.ugicok.ru/assets/bin.exe
  - download URL
- ▶ GB 29 NWBK 601613 31926819
  - IBAN number
  - Swift: NWBK, Account number: 31926819, Currency: GBP
- ▶ +12243359185
  - phone number
- ▶ Wallace Breen is from GB
  - name and nationality

└ Case study 1: Scam call

└ Case study 1: Scam call

1. We are dealing with fake values

Extracted values

- ▶ 194.78.89.250
  - ip-address from log file
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- ▶ +12243359185
  - phone number
- ▶ Wallace Breen is from GB
  - name and nationality

# CASE STUDY 1: SCAM CALL

## Tasks

1. Create an new *event* to be shared with **all**
2. Encode binary to be shared with **CSIRT**
3. Encode ip address to be shared with both **ISP** and **CSIRT**
4. Encode domain and url to be shared with both **ISP** and **CSIRT**
5. Encode bank account to be shared with **Financial sector**
6. Encode phone number to be shared with **Telecommunication sector**
7. Encode full name and nationality to be shared with **LEA only**
8. Add relationships to recreate the events
9. Add time component to recreate the chronology
10. Perform enrichments on the binary, and other attribute
11. Add contextualization
12. Create a small write-up as an *event report*
13. Review the distribution level and publish

## Mapping investigations and cases in MISIP

### └ Case study 1: Scam call

### └ Case study 1: Scam call

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#### Tasks

1. Create an new event to be shared with **all**
2. Encode binary to be shared with **CSIRT**
3. Encode ip address to be shared with both **ISP** and **CSIRT**
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12. Create a small write-up as an event report
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# CASE STUDY 1: SCAM CALL


## ► CREATING THE *EVENT* IN MISP

Date


2022-03-24

Distribution 

All communities

Threat Level 

Low

Analysis 

Completed

Event Info

Successful Scam call involving money transfer

Extends Event

Event UUID or ID. Leave blank if not applicable.




Submit

Mapping investigations and cases in MISP

└ Case study 1: Scam call

└ Case study 1: Scam call  
event in MISP ► Creating the

CASE STUDY 1: SCAM CALL  
► CREATING THE EVENT IN MISP

Date	Distribution 
2022-03-24	All communities
Threat Level 	Analysis 
Low	Completed
Event Info	
Successful Scam call involving money transfer	
Extends Event	
Event UUID or ID. Leave blank if not applicable.	
<input type="button" value="Submit"/>	

# CASE STUDY 1: SCAM CALL

## ► ADDING THE BINARY AS ATTACHMENT

- Pick the Payload Delivery category
- Check *Is a malware sample*

### Add Attachment(s)

Category ⓘ

Payload delivery

Distribution ⓘ

Inherit event

Contextual Comment

Browse... bin.exe

☒ Is a malware sample (encrypt and hash)

☐ Advanced extraction

Upload

## Mapping investigations and cases in MISP

└ Case study 1: Scam call

└ Case study 1: Scam call as attachment ► Adding the binary

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CASE STUDY 1: SCAM CALL  
► ADDING THE BINARY AS ATTACHMENT

- Pick the Payload Delivery category
- Check *Is a malware sample*

Add Attachment(s)

Category ⓘ  
Payload delivery

Distribution ⓘ  
Inherit event

Contextual Comment

bin.exe

☒ Is a malware sample (encrypt and hash)

☐ Advanced extraction



# CASE STUDY 1: SCAM CALL

## ► ENCODE THE IP ADDRESS

- Encode the IP address of the scammer with an *attribute*
- Pick the Payload Installation *category* and ip-src *type*
- Check the For Intrusion Detection System
- Add a contextual comment such as
  - IP address of the scammer collected from the RDP log file

The screenshot shows the MISIP interface for encoding an IP address. It includes the following fields and options:

- Category:** Payload delivery (dropdown)
- Type:** ip-src (dropdown)
- Distribution:** Inherit event (dropdown)
- Value:** 194.78.89.250 (text input)
- Contextual Comment:** IP address of the scammer collected from the RDP log file (text input)
- For Intrusion Detection System:** ☒ (checkbox)
- Batch Import:** ☐ (checkbox)
- Disable Correlation:** ☐ (checkbox)

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## Mapping investigations and cases in MISIP

### └ Case study 1: Scam call

### └ Case study 1: Scam call ► Encode the IP address

This is a smaller version of the MISIP interface shown in the previous block, displaying the same fields and options for encoding an IP address.

## CASE STUDY 1: SCAM CALL

- ▶ ENCODE THE DOMAIN/URL USED TO DOWNLOAD THE BINARY

- As these two attributes are contextually linked between each others, we should use an URL *object*
- Add a contextual comment such as
  - ▶ URL used by the scammer to download the binary
- Include at least: url, domain and ressource\_path

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## Mapping investigations and cases in MISP

### └ Case study 1: Scam call

### └ Case study 1: Scam call ▶ Encode the domain/URL used to download the binary

#### CASE STUDY 1: SCAM CALL

▶ ENCODE THE DOMAIN/URL USED TO DOWNLOAD THE BINARY

- As these two attributes are contextually linked between each others, we should use an URL object
- Add a contextual comment such as
  - ▶ URL used by the scammer to download the binary
- Include at least: url, domain and ressource\_path

# CASE STUDY 1: SCAM CALL

## Object pre-save review

Make sure that the below Object reflects your expectation before submitting it.

Name	url
Template version	9
Meta-category	network
Distribution	Inherit event
Comment	URL used by the scammer to download the binary
First seen	2022-03-24T12:06:32.000000+00:00
Last seen	

Attribute	Category	Type	Value	To IDS
url	Network activity	url	https://zdgoyot.ugic0k.ru/assets/bin.exe	Yes
domain	Network activity	domain	zdgoyot.ugic0k.ru	Yes
domain_without_tid	Other	text	zdgoyot.ugic0k	No
resource_path	Other	text	/assets/bin.exe	No
scheme	Other	text	https	No
tid	Other	text	ru	No

Update objectBack to reviewCancel

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## Mapping investigations and cases in MISP

└ Case study 1: Scam call

└ Case study 1: Scam call

CASE STUDY 1: SCAM CALL

Object pre-save review

Make sure that the below Object reflects your expectation before submitting it.

Name	url
Template version	9
Meta-category	network
Distribution	Inherit event
Comment	URL used by the scammer to download the binary
First seen	2022-03-24T12:06:32.000000+00:00
Last seen	

Attribute	Category	Type	Value	To IDS
url	Network activity	url	https://zdgoyot.ugic0k.ru/assets/bin.exe	Yes
domain	Network activity	domain	zdgoyot.ugic0k.ru	Yes
domain_without_tid	Other	text	zdgoyot.ugic0k	No
resource_path	Other	text	/assets/bin.exe	No
scheme	Other	text	https	No
tid	Other	text	ru	No

Update objectBack to reviewCancel

# CASE STUDY 1: SCAM CALL

## ► ENCODE THE BANK ACCOUNT

- As these 4 attributes are contextually linked between each others, we should use an bank-account *object*
- Add a contextual comment such as
  - Bank account that received the money.  
Supposed to belong to the scammer
- Include at least: iban, swift, account and currency\_code

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## Mapping investigations and cases in MISp

### └ Case study 1: Scam call

### └ Case study 1: Scam call    ► Encode the bank account

CASE STUDY 1: SCAM CALL  
► ENCODE THE BANK ACCOUNT

- As these 4 attributes are contextually linked between each others, we should use an **bank-account** object
- Add a contextual comment such as
  - Bank account that received the money.  
Supposed to belong to the scammer
- Include at least: iban, swift, account and currency\_code

# CASE STUDY 1: SCAM CALL

## Object pre-save review

Make sure that the below Object reflects your expectation before submitting it.

Name	bank-account
Template version	3
Meta-category	financial
Distribution	Inherit event
Comment	Bank account that received the money. Supposed to belong to the scammer
First seen	
Last seen	

Attribute	Category	Type	Value	To IDS
iban	Financial fraud	iban	GB29NWBK60161331926819	Yes
swift	Financial fraud	bic	NWBK	Yes
account	Financial fraud	bank-account-nr	31926819	Yes
currency-code	Other	text	GBP	No

[Update object](#)[Back to review](#)[Cancel](#)

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## Mapping investigations and cases in MISP

└ Case study 1: Scam call

└ Case study 1: Scam call

### Object pre-save review

Make sure that the below Object reflects your expectation before submitting it.

Name	bank-account
Template version	3
Meta-category	financial
Distribution	Inherit event
Comment	Bank account that received the money. Supposed to belong to the scammer
First seen	
Last seen	

Attribute	Category	Type	Value	To IDS
iban	Financial fraud	iban	GB29NWBK60161331926819	Yes
swift	Financial fraud	bic	NWBK	Yes
account	Financial fraud	bank-account-nr	31926819	Yes
currency-code	Other	text	GBP	No

[Update object](#)[Back to review](#)[Cancel](#)

# CASE STUDY 1: SCAM CALL

## ► ENCODE THE PHONE NUMBER

- Pick the Financial Fraud category and phone-number type
- Add a contextual comment such as
  - Phone number used by the scammer to call the victim
- Check For Intrusion Detection System

The screenshot shows the MISIP interface for encoding a phone number. It includes a 'Category' dropdown set to 'Financial fraud', a 'Type' dropdown set to 'phone-number', a 'Distribution' dropdown set to 'Inherit event', a 'Value' text box containing '+12243359185', a 'Contextual Comment' text box containing 'Phone number used by the scammer to call the victim', and three checkboxes: 'For Intrusion Detection System' (checked), 'Batch Import' (unchecked), and 'Disable Correlation' (unchecked).

Category	Type
Financial fraud	phone-number

Distribution

Inherit event

Value

+12243359185

Contextual Comment

Phone number used by the scammer to call the victim

☒ For Intrusion Detection System

☐ Batch Import

☐ Disable Correlation

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## Mapping investigations and cases in MISIP

### └ Case study 1: Scam call

### └ Case study 1: Scam call ► Encode the phone number

This is a smaller version of the MISIP interface shown in the previous block, displaying the same fields and options for encoding a phone number.

# CASE STUDY 1: SCAM CALL

## ► ENCODE THE FULL NAME AND NATIONALITY

- As these attributes are contextually linked between each others, we should use a **person *object***
- Add a contextual comment such as
  - Name of the scammer given to the victim
- Include at least: **full-name, nationality and role**

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## Mapping investigations and cases in MISp

### └ Case study 1: Scam call

#### └ Case study 1: Scam call name and nationality

#### ► Encode the full

CASE STUDY 1: SCAM CALL  
► ENCODE THE FULL NAME AND NATIONALITY

- As these attributes are contextually linked between each others, we should use a **person object**
- Add a contextual comment such as
  - Name of the scammer given to the victim
- Include at least: **full-name, nationality and role**

# CASE STUDY 1: SCAM CALL

## Object pre-save review

Make sure that the below Object reflects your expectation before submitting it.

Name	person
Template version	16
Meta-category	misc
Distribution	Inherit event
Comment	Name of the scammer given to the victim. Name confirmed to be the owner of the bank account and phone number

First seen

Last seen

Attribute	Category	Type	Value	To IDS
last-name	Person	last-name	Breen	No
full-name	Person	full-name	Wallace Breen	No
first-name	Person	first-name	Wallace	No
role	Other	text	Accused	No
gender	Person	gender	Male	No
nationality	Person	nationality	British	No

Update object

Back to review

Cancel

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## Mapping investigations and cases in MISp

└ Case study 1: Scam call

└ Case study 1: Scam call

### Object pre-save review

Make sure that the below Object reflects your expectation before submitting it.

Name	person
Template version	16
Meta-category	misc
Distribution	Inherit event
Comment	Name of the scammer given to the victim. Name confirmed to be the owner of the bank account and phone number
First seen	
Last seen	

Attribute	Category	Type	Value	To IDS
last-name	Person	last-name	Breen	No
full-name	Person	full-name	Wallace Breen	No
first-name	Person	first-name	Wallace	No
role	Other	text	Accused	No
gender	Person	gender	Male	No
nationality	Person	nationality	British	No

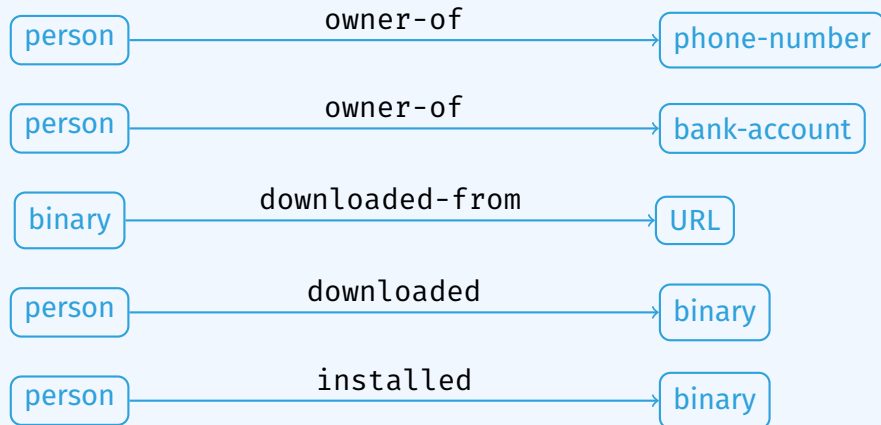
Update object Back to review Cancel



# CASE STUDY 1: SCAM CALL

## ► CREATING RELATIONSHIPS

Add (at least) these relationships to recreate the story

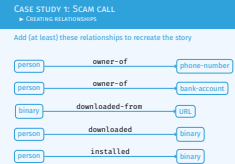


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## Mapping investigations and cases in MISp

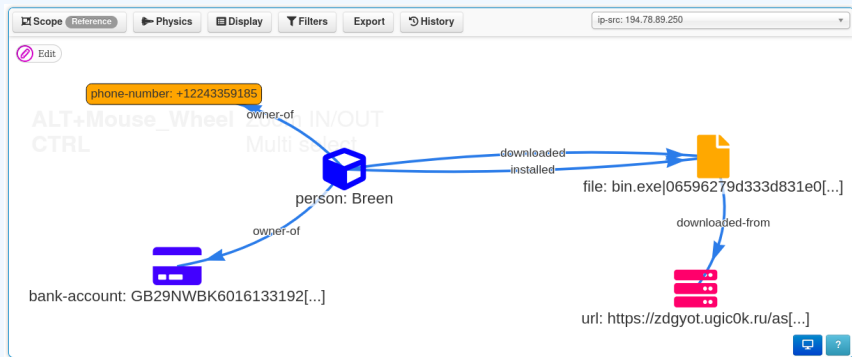
└ Case study 1: Scam call

└ Case study 1: Scam call relationships ► Creating



# CASE STUDY 1: SCAM CALL

## ► CREATING RELATIONSHIPS



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## Mapping investigations and cases in MISP

### └ Case study 1: Scam call

### └ Case study 1: Scam call ► Creating relationships

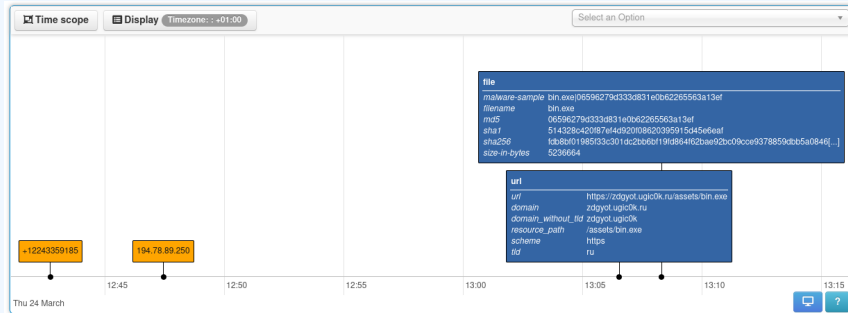


# CASE STUDY 1: SCAM CALL

## ► ADDING TIME COMPONENT

The time component is useful to recreate the chronology

- Main focus is the Cyber Threat Intelligence (CTI) aspect



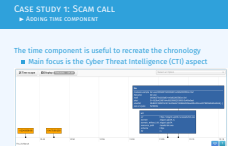
2022-03-30

## Mapping investigations and cases in MISp

└ Case study 1: Scam call

└ Case study 1: Scam call ► Adding time component

1. The time can be added by giving a value to the 'first-seen' and 'last-seen' on an Attribute or Object
2. It can also be done by drag-and-drop using the timeline directly



# CASE STUDY 1: SCAM CALL

## ► PERFORM ENRICHMENTS

- Scammer IP address to get its location
- Binary to check if it's an existing (and malicious) application

### Mmdb Lookup:

Object: geolocation

country	Belgium
countrycode	BE
latitude	50.8333
longitude	4
text	db_source: GeoOpen-Country. build_db: 2022-02-05 10:37:33. Latitude and longitude are country average.

Object: geolocation

country	Belgium
countrycode	BE
latitude	50.8333
longitude	4
text	db_source: GeoOpen-Country-ASN. build_db: 2022-02-06 09:30:25. Latitude and longitude are country average.

Object: asn

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## Mapping investigations and cases in MISp

└ Case study 1: Scam call

└ Case study 1: Scam call ► Perform enrichments

CASE STUDY 1: SCAM CALL

► PERFORM ENRICHMENTS

■ Scammer IP address to get its location

■ Binary to check if it's an existing (and malicious) application

Mmdb Lookup

Object: geolocation

country	Belgium
countrycode	BE
latitude	50.8333
longitude	4
text	db_source: GeoOpen-Country. build_db: 2022-02-05 10:37:33. Latitude and longitude are country average.

Object: geolocation

country	Belgium
countrycode	BE
latitude	50.8333
longitude	4
text	db_source: GeoOpen-Country-ASN. build_db: 2022-02-06 09:30:25. Latitude and longitude are country average.

Object: asn

asn	3412
-----	------

# CASE STUDY 1: SCAM CALL

## ► CONTEXTUALIZING THE DATA WITH *TAXONOMIES*

- Note: Different country / sectors might use different nomenclature
- Suggestions for tagging with taxonomies:
  - `circl:incident-classification="scam"`
  - `social-engineering-attack-vectors:non-technical="technical-expert"`
  - `social-engineering-attack-vectors:technical="vishing"`
  - `veris:action:hacking:vector="Desktop sharing"`
  - `veris:action:malware:vector="Direct install"`
  - `veris:action:social:variety="Scam"`
  - `veris:action:social:vector="Phone"`
  - `veris:actor:external:motive="Financial"`
  - `veris:impact:loss:rating="Minor"`
  - `veris:impact:loss:variety="Asset and fraud"`
  - `workflow:state="complete"`
  - `tlp:green`

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## Mapping investigations and cases in MISP

### └ Case study 1: Scam call

### └ Case study 1: Scam call. ► Contextualizing the data with *Taxonomies*

#### CASE STUDY 1: SCAM CALL

##### ► CONTEXTUALIZING THE DATA WITH TAXONOMIES

- Note: Different country / sectors might use different nomenclature
- Suggestions for tagging with taxonomies:
  - `circl:incident-classification="scam"`
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  - `veris:action:social:variety="Scam"`
  - `veris:action:social:vector="Phone"`
  - `veris:actor:external:motive="Financial"`
  - `veris:impact:loss:rating="Minor"`
  - `veris:impact:loss:variety="Asset and fraud"`
  - `workflow:state="complete"`
  - `tlp:green`

# CASE STUDY 1: SCAM CALL

## ► CONTEXTUALIZING THE DATA WITH *TAXONOMIES*

Tags

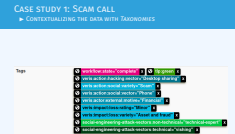
**workflow:state="complete"** x **tlp:green** x  
**veris:action:hacking:vector="Desktop sharing"** x  
**veris:action:social:variety="Scam"** x  
**veris:action:social:vector="Phone"** x  
**veris:actor:external:motive="Financial"** x  
**veris:impact:loss:rating="Minor"** x  
**veris:impact:loss:variety="Asset and fraud"** x  
**social-engineering-attack-vectors:non-technical="technical-expert"** x  
**social-engineering-attack-vectors:technical="vishing"** x

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Mapping investigations and cases in MISP

└ Case study 1: Scam call

└ Case study 1: Scam call. ► Contextualizing the data with *Taxonomies*



# CASE STUDY 1: SCAM CALL

## ► CONTEXTUALIZING THE DATA WITH *GALAXY CLUSTERS*

- Note: Different country / sectors might use different nomenclature
- Suggestions for tagging with Galaxies Clusters:
  - MITRE Att&ck Pattern

Galaxies

Attack Pattern Q

🌐 Phishing - T1566 Q ≡ 🗑

🌐 User Execution - T1204 Q ≡ 🗑

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## Mapping investigations and cases in MISP

### └ Case study 1: Scam call

### └ Case study 1: Scam call the data with *Galaxy Clusters* ► Contextualizing

CASE STUDY 1: SCAM CALL

► CONTEXTUALIZING THE DATA WITH GALAXY CLUSTERS

■ Note: Different country / sectors might use different nomenclature

■ Suggestions for tagging with Galaxies Clusters:

- MITRE Att&ck Pattern

Galaxies

Attack Pattern Q

🌐 Phishing - T1566 Q ≡ 🗑

🌐 User Execution - T1204 Q ≡ 🗑

# CASE STUDY 1: SCAM CALL

## ► MITIGATIONS AND DETECTION

Thanks to the MITRE Att&ck contextualization, we can derive preventive measures from their catalogue

### ■ Mitigations

- Antivirus
- Behavior Prevention on Endpoint
- Execution Prevention
- Network Intrusion Prevention
- Restrict Web-Based Content
- Software Configuration
- User Training

### ■ Detection

- Application Log
- Container
- File
- Network Traffic
- Process

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## Mapping investigations and cases in MISp

### └ Case study 1: Scam call

### └ Case study 1: Scam call Detection ► Mitigations and

CASE STUDY 1: SCAM CALL

► MITIGATIONS AND DETECTION

Thanks to the MITRE Att&ck contextualization, we can derive preventive measures from their catalogue

#### ■ Mitigations

- Antivirus
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- Network Intrusion Prevention
- Restrict Web-Based Content
- Software Configuration
- User Training

#### ■ Detection

- Application Log
- Container
- File
- Network Traffic
- Process



# CASE STUDY 1: SCAM CALL

## ► WRITE-UP WITH AN *EVENT REPORT*

- Create the *event report* with a concise name
- Example: Executive summary of the case
  - Leave its content empty as it can be edited with more ease in the editor afterward
- Write a summary with
  - Quick chronology
  - Written explanation of the steps tooks by the scammer
  - Reference to existing *attributes* or *objects* whenever possible
    - The special syntax is: @[scope]{uuid}

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## Mapping investigations and cases in MISp

### └ Case study 1: Scam call

### └ Case study 1: Scam call *event report* ► Write-up with an

CASE STUDY 1: SCAM CALL  
► Write-up with an event report

- Create the event report with a concise name
- Example: Executive summary of the case
  - Leave its content empty as it can be edited with more ease in the editor afterward
- Write a summary with
  - Quick chronology
  - Written explanation of the steps tooks by the scammer
  - Reference to existing attributes or objects whenever possible
    - The special syntax is: @[scope]{uuid}

# CASE STUDY 1: SCAM CALL

## ► WRITE-UP WITH AN *EVENT REPORT*

### Executive summary of the case

A victim was called by the suspected scammer **person** **Wallace Breen** using the following number: **phone-number** **+12243359185**. The scammer pretended to be a microsoft employee, managed to convince the victim that he could help by using remote desktop assistance.

Once he had access, the scammer downloaded a binary **file** **bin.exe** from the following url **url** **https://zdgoyt.ugic0k.ru/assets/bin.exe**. He then proceed to install the binary, probably to use it a backdoor for future access.

After the installation, he asked the victim to transfer money to the scammer bank account: **bank-account** **iban** **GB29NWBK60161331926819**

The day after, the victim suspecting a scam contacted the police.

### Technique used

Social vector	<b>veris.action:social:vectors</b> ="Phone"
Potential hacking vector	<b>veris.action:hacking:vectors</b> ="Desktop sharing"
Actor motive	<b>veris.actor:external:motives</b> ="Financial"
Impacted loss	<b>veris.impact:loss:variety</b> ="Asset and fraud"
Loss rating	<b>veris.impact:loss:ratings</b> ="Minor"

### Information collected after analysis

- According to the phone number, IP address and bank account, the scammer **person** **Wallace Breen** is very likely based in **geolocation** **country** **Belgium**.

### Timeline

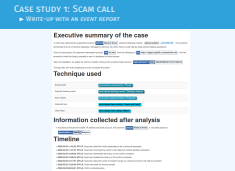
- 2022-03-25 11:42:43 UTC+0**: Scammer called the victim pretending to be a microsoft employee
- 2022-03-25 11:47:27 UTC+0**: Scammer convinced the victim to be helped via remote desktop assistance
- 2022-03-25 12:06:32 UTC+0**: Scammer downloaded the binary on the victim's computer
- 2022-03-25 12:08:18 UTC+0**: Scammer installed the binary on the victim's computer
- 2022-03-25 12:17:51 UTC+0**: Scammer asked the victim to transfer money on a bank account for the help he provided
- 2022-03-25 12:25:04 UTC+0**: Victim executed the money transfer
- 2022-03-25 08:39:21 UTC+0**: Victim contacted police

## Mapping investigations and cases in MISp

### └ Case study 1: Scam call

### └ Case study 1: Scam call *event report*

### ► Write-up with an

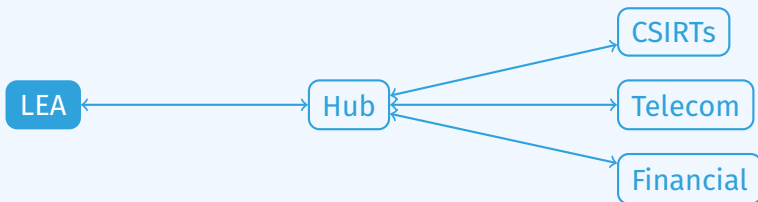


# CASE STUDY 1: SCAM CALL

## ► REVIEW THE DISTRIBUTION LEVEL AND PUBLISH

In our case, we consider the following MISP network topology

- The current instance is owned and managed by a LEA
- The current instance is connected to a central MISP instance acting as a "Hub"
- The "Hub" is connected to various other MISP instances such as other LEAs, CSIRTs, Financial and telecom institutions



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## Mapping investigations and cases in MISP

### └ Case study 1: Scam call

### └ Case study 1: Scam call ► Review the distribution level and publish

**CASE STUDY 1: SCAM CALL**  
► REVIEW THE DISTRIBUTION LEVEL AND PUBLISH

In our case, we consider the following MISP network topology

- The current instance is owned and managed by a LEA
- The current instance is connected to a central MISP instance acting as a "Hub"
- The "Hub" is connected to various other MISP instances such as other LEAs, CSIRTs, Financial and telecom institutions

```
graph LR; LEA[LEA] <--> Hub[Hub]; Hub --> CSIRTs[CSIRTs]; Hub --> Telecom[Telecom]; Hub --> Financial[Financial];
```

# CASE STUDY 1: SCAM CALL

## ► REVIEW THE DISTRIBUTION LEVEL AND PUBLISH

- binary file: **All communities**
- person: **LEA Sharing group**
- geolocation: **LEA Sharing group**
- ip: **LEA Sharing group**
  - The IP might be reassigned
- phone
  - If part of a telco sharing group **Telco Sharing group**
  - **Connected communities** otherwise
- bank account
  - If part of a financial sharing group **Financial Sharing group**
  - **Connected communities** otherwise

→ **Publish the event!**

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## Mapping investigations and cases in MISp

└ Case study 1: Scam call

└ Case study 1: Scam call  
distribution level and publish

► Review the

CASE STUDY 1: SCAM CALL

► REVIEW THE DISTRIBUTION LEVEL AND PUBLISH

- binary file: **All communities**
  - person: **LEA Sharing group**
  - geolocation: **LEA Sharing group**
  - ip: **LEA Sharing group**
    - The IP might be reassigned
  - phone
    - If part of a telco sharing group **Telco Sharing group**
    - **Connected communities** otherwise
  - bank account
    - If part of a financial sharing group **Financial Sharing group**
    - **Connected communities** otherwise
- Publish the event!

# CASE STUDY 2: RANSOMWARE

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Mapping investigations and cases in MISP

└ Case study 2: Ransomware

CASE STUDY 2: RANSOMWARE

**Case:** Ransomware infection via e-mail

### Chronology - 2022-03-24

- 11:42:43 UTC+0:** Email containing the ransomware from supposedly Andrew Ryan
- 11:47:27 UTC+0:** Email was read and its attachment opened and executed
- 11:47:28 UTC+0:** Malware add persistence
- 12:08:18 UTC+0:** Malware successfully contacted the C2 to get the PK
- 12:08:19 UTC+0:** Malware saved the PK in the registry
- 12:25:04 UTC+0:** Malware began the encryption process
- 2022-03-25 08:39:21 UTC+0:** Victim contacted the police

2022-03-30

## Mapping investigations and cases in MISP

└ Case study 2: Ransomware

└ Case study 2: Ransomware

Case: Ransomware infection via e-mail

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2022-03-25 08:39:21 UTC+0: Victim contacted the police

# CASE STUDY 2: RANSOMWARE

## Splash message from the Ransomware



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## Mapping investigations and cases in MISP

└ Case study 2: Ransomware

└ Case study 2: Ransomware



## CASE STUDY 2: RANSOMWARE

### Collected evidences

- ▶ E-mail received by the victim
- ▶ E-mail attachment of the ransomware as an .exe payload
- ▶ Windows registry
- ▶ Ransomware's public key (PK)
- ▶ Captured network traffic
- ▶ Message displayed by the ransomware

### Data extracted from evidences

- ▶ Original **e-mail**
- ▶ The actual ransomware **binary**
- ▶ **Registry Keys** for persistence and configuration
- ▶ **Public Key** used for encryption
- ▶ C&C server **ip address** used to generate the Private Key (SK)
- ▶ The **bitcoin address** on which the ransom should be paid
- ▶ The **person**, impersonated or fake that sent the email

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## Mapping investigations and cases in MISP

└ Case study 2: Ransomware

└ Case study 2: Ransomware

#### Collected evidences

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- ▶ The **person**, impersonated or fake that sent the email



# CASE STUDY 2: RANSOMWARE

Subject: 4829—2375  
From: "Andrew\_Ryan" <Andrew\_Ryan@rindustries.rp>

Please see the attached Iolta report for 4829—2375.

We received a check request in the amount of \$19,637.28 for the above referenced file .  
However, the attached report reflects a \$0 balance. At your earliest convenience,  
please advise how this request is to be funded.

Thanks.

Andrew\_Ryan \*  
Accounts Payable

Ryan Industries  
42, Central Control Hephaestus — Rapture  
www.rindustries.rp

\*Not licensed to practise law.

This communication contains information that is intended only for the recipient named and  
may be privileged, confidential, subject to the attorney—client privilege, and/or  
exempt from disclosure under applicable law. If you are not the intended recipient  
or agent responsible for delivering this communication to the intended recipient,  
you are hereby notified that you have received this communication in error, and  
that any review, disclosure, dissemination, distribution, use, or copying of this  
communication is STRICTLY PROHIBITED. If you have received this communication in  
error, please notify us immediately by telephone at 1—800—766—7751 or  
1—972—643—6600 and destroy the material in its entirety, whether in electronic or  
hard copy format.

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## Mapping investigations and cases in MISp

└ Case study 2: Ransomware

└ Case study 2: Ransomware

### 1. We are dealing with fake values

CASE STUDY 2: RANSOMWARE

```
Subject: 4829—2375
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Accounts Payable

Ryan Industries
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*Not licensed to practise law.

This communication contains information that is intended only for the recipient named and
may be privileged, confidential, subject to the attorney—client privilege, and/or
exempt from disclosure under applicable law. If you are not the intended recipient
or agent responsible for delivering this communication to the intended recipient,
you are hereby notified that you have received this communication in error, and
that any review, disclosure, dissemination, distribution, use, or copying of this
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1—972—643—6600 and destroy the material in its entirety, whether in electronic or
hard copy format.
```

# CASE STUDY 2: RANSOMWARE

## Extracted values

- ▶ e-mail from previous slide
- ▶ cryptolocker.exe
  - Ransomware attached to the mail
- ▶ 81.177.170.166
  - ip-address of a C2 server used to generate the SK
- ▶ HKCU\SOFTWARE\Microsoft\Windows\CurrentVersion\Run "CryptoLocker"
  - The registry key used for persistence
- ▶ HKCU\SOFTWARE\CryptoLocker VersionInfo
  - The registry key containing configuration data
- ▶ HKCU\SOFTWARE\CryptoLocker PublicKey
  - The registry key containing the RSA public key received from the C2 server
- ▶ 0x819C33AE
  - XOR key used to encode the configuration data

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## Mapping investigations and cases in MISP

└ Case study 2: Ransomware

└ Case study 2: Ransomware

1. We are dealing with fake values

CASE STUDY 2: RANSOMWARE

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### └ Case study 2: Ransomware

### └ Case study 2: Ransomware

```
-----BEGIN PUBLIC KEY-----
MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQDaogllvHPyTDAdUWZPk9aWXJ5G
Lk9F+HzDaJ5qGXou8XmISwChbia/NC84QmBHTiyg4B1tqVjqk5X6yh6pcZuVw+GX
oCrH5O5o2QoXVYzYYsEZQB36VHxwm7xTx21yOy2rSOQy0upQ6e7HMGtu7p7+RlWO
D5UfPkv337plrEiUuwIDAQAB
-----END PUBLIC KEY-----
```

- ▶ The public key received from the C2 used to encrypt files
- 1KP72fBmh3XBRfuJDMn53APaqM6iMRspCh
  - ▶ Bitcoin address on which to transfer the ransom
- Andrew Ryan, Andrew\_Ryan@rindustries.rp
  - ▶ Accountant, Suspect & Victim & Originator
  - ▶ Person, e-mail, occupation and role

```
-----BEGIN PUBLIC KEY-----
MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQDaogllvHPyTDAdUWZPk9aWXJ5G
Lk9F+HzDaJ5qGXou8XmISwChbia/NC84QmBHTiyg4B1tqVjqk5X6yh6pcZuVw+GX
oCrH5O5o2QoXVYzYYsEZQB36VHxwm7xTx21yOy2rSOQy0upQ6e7HMGtu7p7+RlWO
D5UfPkv337plrEiUuwIDAQAB
-----END PUBLIC KEY-----
```

- ▶ The public key received from the C2 used to encrypt files
- 1KP72fBmh3XBRfuJDMn53APaqM6iMRspCh
  - ▶ Bitcoin address on which to transfer the ransom
- Andrew Ryan, Andrew\_Ryan@rindustries.rp
  - ▶ Accountant, Suspect & Victim & Originator
  - ▶ Person, e-mail, occupation and role

### Tasks

1. Create an new *event* to be shared with **all**
2. Encode data to be shared
3. Add relationships to recreate the events
4. Add time component to recreate the chronology
5. Perform enrichments on the binary, and other attributes
6. Add contextualization
7. Create a small write-up as an *event report*
8. Review the distribution level and publish

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware

#### Tasks

1. Create an new event to be shared with **all**
2. Encode data to be shared
3. Add relationships to recreate the events
4. Add time component to recreate the chronology
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6. Add contextualization
7. Create a small write-up as an event report
8. Review the distribution level and publish

## CASE STUDY 2: RANSOMWARE

### ► CREATING THE *EVENT* IN MISP

Date

2022-03-24

Distribution 

All communities

Threat Level 

Medium

Analysis 

Completed

Event Info

CryptoLocker ransomware infection via e-mail

Extends Event

Event UUID or ID. Leave blank if not applicable.

Submit

2022-03-30

## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware


### └ Case study 2: Ransomware


event in MISP


### ► Creating the

CASE STUDY 2: RANSOMWARE  
► CREATING THE EVENT IN MISP

Date

Distribution 

Threat Level 

Analysis 

Event Info

Extends Event

## CASE STUDY 2: RANSOMWARE

### ► ADD THE ORIGINAL E-MAIL

- As the email contains multiple contextually linked data points, we should use an Email *object*
- Add contextual comment such as:
  - Email received by the victim containing the ransomware
- Include at least: from, subject and body

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## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware original e-mail ► Add the

CASE STUDY 2: RANSOMWARE

► ADD THE ORIGINAL E-MAIL

- As the email contains multiple contextually linked data points, we should use an Email object
- Add contextual comment such as:
  - Email received by the victim containing the ransomware
- Include at least: from, subject and body

CASE STUDY 2: RANSOMWARE

▶ ADD THE ORIGINAL E-MAIL

Object pre-save review

Make sure that the below Object reflects your expectation before submitting it.

Name	email		
Template version	18		
Meta-category	network		
Distribution	Inherit event		
Comment			
First seen	2022-03-24T11:42:43		
Last seen			

Attribute	Category	Type	Value	To IDS
subject	Payload delivery	email-subject	4829-2375	No
from	Payload delivery	email-src	Andrew_Ryan@rindustries.rp	Yes
email-body	Payload delivery	email-body	Please see the attached Iolta report for 4829-2375. We received a check request in the amount of \$19,637.28 for the above referenced file. However, the attached report reflects a \$0 balance. At your earliest convenience, please advise how this request is to be funded. Thanks. Andrew_Ryan * Accounts Payable Ryan Industries 42, Central Control Hephaestus - Rapture www.rindustries.rp *Not licensed to practise law. This communication contains information that is intended only for the recipient named and may be privileged, confidential, subject to the attorney-client privilege, and/or exempt from disclosure under applicable law. If you are not the intended recipient or agent responsible for delivering this communication to the intended recipient, you are hereby notified that you have received this communication in error, and that any review, disclosure, dissemination, distribution, use, or copying of this communication is STRICTLY PROHIBITED. If you have received this communication in error, please notify us immediately by telephone at 1-800-766-7751 or 1-972-643-6600 and destroy the material in its entirety, whether in electronic or hard copy format.	No

Create new object

Back to review

Cancel

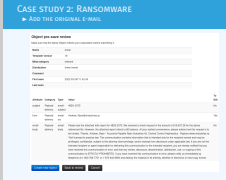
2022-03-30

Mapping investigations and cases in MISP

└ Case study 2: Ransomware

└ Case study 2: Ransomware original e-mail

▶ Add the



## CASE STUDY 2: RANSOMWARE

### ► ADD THE RANSOMWARE BINARY AS ATTACHMENT

- Pick the Payload Delivery category
- Add contextual comment such as:
  - CryptoLocker ransomware delivered by email
- Check *Is a malware sample*

Add Attachment(s)

Category ⓘ  
Payload installation ▼

Distribution ⓘ  
Inherit event ▼

Contextual Comment  
CryptoLocker ransomware delivered by email

cryptolocker.exe

☒ Is a malware sample (encrypt and hash)  
☐ Advanced extraction

2022-03-30

## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware ► Add the ransomware binary as attachment

CASE STUDY 2: RANSOMWARE  
► ADD THE RANSOMWARE BINARY AS ATTACHMENT

■ Pick the Payload Delivery category  
■ Add contextual comment such as:  
► CryptoLocker ransomware delivered by email  
■ Check *Is a malware sample*

Add Attachment(s)

Category ⓘ  
Payload installation ▼

Distribution ⓘ  
Inherit event ▼

Contextual Comment  
CryptoLocker ransomware delivered by email

cryptolocker.exe

☒ Is a malware sample (encrypt and hash)  
☐ Advanced extraction



## CASE STUDY 2: RANSOMWARE

### ► ENCODE THE C2'S IP ADDRESS

- Create an *attribute* and pick the Payload Installation category and ip-src type
- Check the For Intrusion Detection System
- Add a contextual comment such as
  - IP address of the scammer collected from the RDP log file

Add Attribute

Category ⓘ Type ⓘ

Payload delivery ip-src

Distribution ⓘ

Inherit event

Value

81.177.170.166

Contextual Comment

IP of the C2 phoned-home by the ransomware

☒ For Intrusion Detection System

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## Mapping investigations and cases in MISp

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware ► Encode the C2's IP address

CASE STUDY 2: RANSOMWARE

► ENCODE THE C2'S IP ADDRESS

- Create an attribute and pick the Payload Installation category and ip-src type
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- Add a contextual comment such as
  - IP address of the scammer collected from the RDP log file

Add Attribute

Category ⓘ Type ⓘ

Payload delivery ip-src

Distribution ⓘ

Inherit event

Value

81.177.170.166

Contextual Comment

IP of the C2 phoned-home by the ransomware

☒ For Intrusion Detection System

# CASE STUDY 2: RANSOMWARE

## ► ENCODE THE REGISTRY KEYS USED FOR PERSISTENCE

- As the registry keys contains multiple contextually linked data points, we should use an **registry-key** *object*
- Add a contextual comment such as
  - The registry key used for persistence, making sure it gets run again after an OS reboot

**Object pre-save review**  
Make sure that the below Object reflects your expectation before submitting it.

Name	registry-key			
Template version	4			
Meta-category	file			
Distribution	Inherit event			
Comment				
First seen	2022-03-24T11:47:28			
Last seen				

Attribute	Category	Type	Value	To IDS
data	Persistence mechanism	text	"CryptoLocker"	No
key	Persistence mechanism	regkey	SOFTWARE\Microsoft\Windows\CurrentVersion\Run "CryptoLocker"	Yes
root-keys	Other	text	HKCU	No

[Create new object](#) [Back to review](#) [Cancel](#)

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## Mapping investigations and cases in MISp

### └ Case study 2: Ransomware

- └ Case study 2: Ransomware. ► Encode the registry keys used for persistence



# CASE STUDY 2: RANSOMWARE

## ► ENCODE THE REGISTRY KEYS USED FOR STORING THE CONFIGURATION

- As the registry keys contains multiple contextually linked data points, we should use an **registry-key object**
- Add a contextual comment such as
  - Containing configuration data (C2 address, malware version and installation timestamp)

### Object pre-save review

Make sure that the below Object reflects your expectation before submitting it.

Name	registry-key			
Template version	4			
Meta-category	file			
Distribution	Inherit event			
Comment				
First seen	2022-03-24T12:08:18.000000+00:00			
Last seen				

Attribute	Category	Type	Value	To IDS
name	Persistence mechanism	text	VersionInfo	No
key	Persistence mechanism	regkey	HKCU\SOFTWARE\CryptoLocker VersionInfo	Yes
root-keys	Other	text	HKCU	No

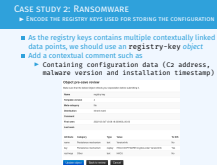
Update objectBack to reviewCancel

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## Mapping investigations and cases in MISp

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware ► Encode the registry keys used for storing the configuration



# CASE STUDY 2: RANSOMWARE

## ► ENCODE THE REGISTRY KEYS USED FOR STORING THE PK

- As the registry keys contains multiple contextually linked data points, we should use an **registry-key object**
- Add a contextual comment such as
  - Contains the RSA public key received from the C2 used for encryption

**Object pre-save review**  
Make sure that the below Object reflects your expectation before submitting it.

Name	registry-key		
Template version	4		
Meta-category	file		
Distribution	Inherit event		
Comment			
First seen	2022-03-24T12:08:19.000000+00:00		
Last seen			

Attribute	Category	Type	Value	To IDS
data	Persistence mechanism	text	-----BEGIN PUBLIC KEY----- MIGIMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQDaogtHHPyIDAdUWZP9aWXJ5G Lk9F+HzDaj5qXou8XmISwChbia/Nc84QmBHTYp4B1tqVjK5XyH6pcZuVw+GX OCiH5O5o2Q0XVYzYY6EZOB36VHxwm7XTx21yOy2rSOQyOupO6e7HMG3u7p7+RWO D5UPkv337prEiUuwIDQAB -----END PUBLIC KEY-----	No
name	Persistence mechanism	text	PublicKey	No
key	Persistence mechanism	regkey	HKCU\SOFTWARE\CryptoLocker PublicKey	Yes
root-keys	Other	text	HKCU	No

[Update object](#) [Back to review](#) [Cancel](#)

## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware ► Encode the registry keys used for storing the PK

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## CASE STUDY 2: RANSOMWARE

### ► ENCODE THE BITCOIN ADDRESS USED TO REVEIVE THE RANSOM

- Create an *attribute* and pick the Financial Fraud category and btc type
- Check the For Intrusion Detection System
- Add a contextual comment such as
  - Hardcoded address on which the ransom is asked to be transferred

The screenshot shows the 'Add Attribute' form with the following fields:

- Category:** Financial fraud
- Type:** btc
- Distribution:** Inherit event
- Value:** 1KP72fBmh3XBRfuJDMn53APaqM6iMRspCh
- Contextual Comment:** (empty text box)

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## Mapping investigations and cases in MISIP

### └ Case study 2: Ransomware

- └ Case study 2: Ransomware
- Encode the bitcoin address used to reveive the ransom

The screenshot shows the MISIP system interface with the 'Add Attribute' form. The form is titled 'Add Attribute' and has the following fields:

- Category:** Financial Fraud
- Type:** btc
- Distribution:** Inherit event
- Value:** 1KP72fBmh3XBRfuJDMn53APaqM6iMRspCh
- Contextual Comment:** (empty text box)

# CASE STUDY 2: RANSOMWARE

## ► ENCODE THE NAME AND ROLES OF THE PERSON

- As these attributes are contextually linked between each others, we should use a **person object**
- Add a contextual comment such as
  - Person from which the mail seems to originate
- Include at least: **full-name, e-mail and roles**

### Object pre-save review

Make sure that the below Object reflects your expectation before submitting it.

Name	person
Template version	16
Meta-category	misc
Distribution	Inherit event
Comment	Person from which the mail seems to originate
First seen	
Last seen	

Attribute	Category	Type	Value	To IDS
last-name	Person	last-name	Ryan	No
full-name	Person	full-name	Andrew Ryan	No
first-name	Person	first-name	Andrew	No
e-mail	Payload delivery	e-mail-src	andrew_ryan@rindustries.rp	Yes
role	Other	text	Suspect	No
role	Other	text	Victim	No
role	Other	text	Originator	No
nationality	Person	nationality	Belarus	No

[Update object](#)[Back to review](#)[Cancel](#)

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## Mapping investigations and cases in MISp

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware name and roles of the person ► Encode the

#### CASE STUDY 2: RANSOMWARE

##### ► ENCODE THE NAME AND ROLES OF THE PERSON

- As these attributes are contextually linked between each others, we should use a **person object**
- Add a contextual comment such as
  - Person from which the mail seems to originate
- Include at least: **full-name, e-mail and roles**



# CASE STUDY 2: RANSOMWARE

## ► ENCODE THE XOR KEY

- As these attributes are contextually linked between each others, we should use a crypto-material *object*
- Add a contextual comment such as
  - XOR key used to encode the malware's configuration in the registry
- Include at least: type and generic-symmetric-key

### Object pre-save review

Make sure that the below Object reflects your expectation before submitting it.

Name	crypto-material			
Template version	4			
Meta-category	misc			
Distribution	Inherit event			
Comment				
First seen				
Last seen				
Attribute	Category	Type	Value	To IDS
type	Other	text	XOR	No
generic-symmetric-key	Artifacts dropped	text	819C33AE	Yes

Update objectBack to reviewCancel

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## Mapping investigations and cases in MISp

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware XOR key ► Encode the

CASE STUDY 2: RANSOMWARE

► ENCODE THE XOR KEY

- As these attributes are contextually linked between each others, we should use a **crypto-material** object
- Add a contextual comment such as
  - XOR key used to encode the malware's configuration in the registry
- Include at least: type and generic-symmetric-key

Object pre-save review

Make sure that the below Object reflects your expectation before submitting it.

Name	crypto-material			
Template version	4			
Meta-category	misc			
Distribution	Inherit event			
Comment				
First seen				
Last seen				

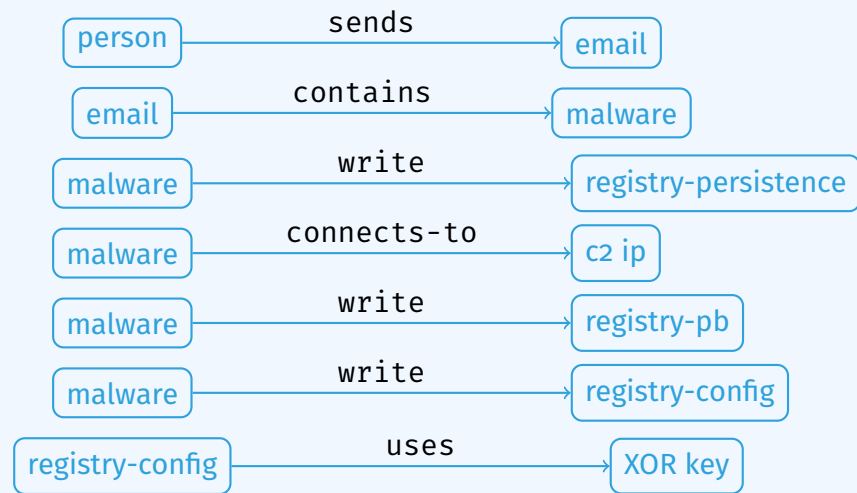
Attribute	Category	Type	Value	To IDS
type	Other	text	XOR	No
generic-symmetric-key	Artifacts dropped	text	819C33AE	Yes

Update objectBack to reviewCancel

## CASE STUDY 2: RANSOMWARE

### ► CREATING RELATIONSHIPS

Add (at least) these relationships to recreate the story

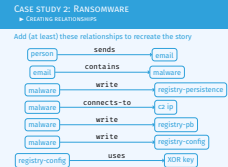


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## Mapping investigations and cases in MISP

└ Case study 2: Ransomware

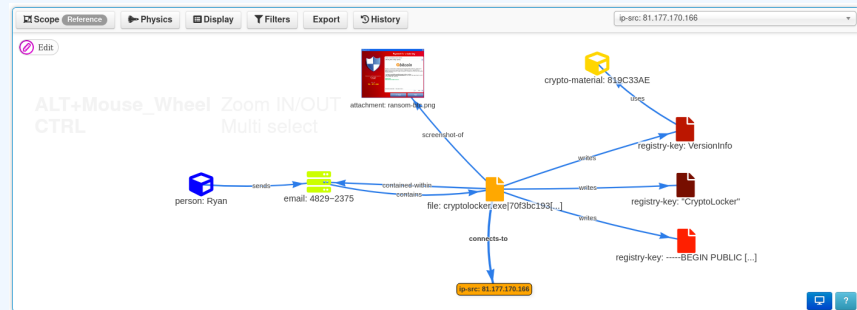
└ Case study 2: Ransomware relationships ► Creating





# CASE STUDY 2: RANSOMWARE

## ► CREATING RELATIONSHIPS

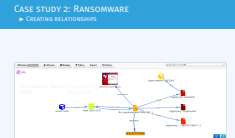


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## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware ► Creating relationships

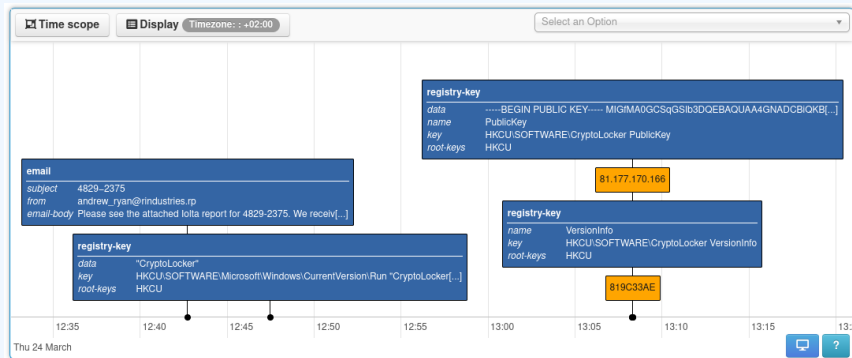


# CASE STUDY 2: RANSOMWARE

## ► ADDING TIME COMPONENT

The time component is useful to recreate the chronology

- Main focus is the Cyber Threat Intelligence (CTI) aspect



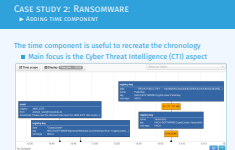
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## Mapping investigations and cases in MISp

└ Case study 2: Ransomware

└ Case study 2: Ransomware ► Adding time component

1. The time can be added by giving a value to the 'first-seen' and 'last-seen' on an Attribute or Object
2. It can also be done by drag-and-drop using the timeline directly





# CASE STUDY 2: RANSOMWARE

## ► PERFORM ENRICHMENTS

### ■ Bitcoin wallet to view the transactions

Btc Steroids:

Address: 1KP72fBmh3XBRfuJDMn53APaqM6iMRspCh

Balance: 0.0000000000 BTC (+54.9083000000 BTC / -54.9083000000 BTC)

Transactions: 40

#40	19 Nov 2013 12:03:48 UTC	-0.00020000 BTC	0.13 USD	0.10 EUR
#39	15 Oct 2013 15:16:44 UTC	-2.00000000 BTC	316.18 USD	227.78 EUR
#39	15 Oct 2013 15:16:44 UTC	-1.99950000 BTC	316.10 USD	227.72 EUR

#39	Sum:	-3.99950000 BTC	632.28 USD	455.50 EUR
-----	------	-----------------	------------	------------

#38	15 Oct 2013 02:12:02 UTC	-2.00000000 BTC	316.18 USD	227.78 EUR
#37	13 Oct 2013 21:03:42 UTC	-2.00000000 BTC	295.06 USD	211.26 EUR
#36	11 Oct 2013 21:23:33 UTC	-2.00000000 BTC	280.20 USD	204.02 EUR
#36	11 Oct 2013 21:23:33 UTC	-2.00000000 BTC	280.20 USD	204.02 EUR

#36	Sum:	-4.00000000 BTC	560.40 USD	408.04 EUR
-----	------	-----------------	------------	------------

#35	08 Oct 2013 23:24:22 UTC	-2.00000000 BTC	272.98 USD	199.28 EUR
#35	08 Oct 2013 23:24:22 UTC	-2.00000000 BTC	272.98 USD	199.28 EUR

#35	Sum:	-4.00000000 BTC	545.96 USD	398.56 EUR
-----	------	-----------------	------------	------------

#34	07 Oct 2013 08:26:25 UTC	-2.00000000 BTC	271.60 USD	198.90 EUR
#34	07 Oct 2013 08:26:25 UTC	-2.00000000 BTC	271.60 USD	198.90 EUR
#34	07 Oct 2013 08:26:25 UTC	-2.00000000 BTC	271.60 USD	198.90 EUR
#34	07 Oct 2013 08:26:25 UTC	-2.00000000 BTC	271.60 USD	198.90 EUR

#34	Sum:	-8.00000000 BTC	1086.40 USD	795.60 EUR
-----	------	-----------------	-------------	------------

## Mapping investigations and cases in MISp

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware ► Perform enrichments

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CASE STUDY 2: RANSOMWARE

► PERFORM ENRICHMENTS

■ Bitcoin wallet to view the transactions

Bitcoin

Address: 1KP72fBmh3XBRfuJDMn53APaqM6iMRspCh

Balance: 0.0000000000 BTC (+54.9083000000 BTC / -54.9083000000 BTC)

Transactions: 40

#40

19 Nov 2013 12:03:48 UTC

-0.00020000 BTC

0.13 USD

0.10 EUR

#39

15 Oct 2013 15:16:44 UTC

-2.00000000 BTC

316.18 USD

227.78 EUR

#39

15 Oct 2013 15:16:44 UTC

-1.99950000 BTC

316.10 USD

227.72 EUR

Sum:

-3.99950000 BTC

632.28 USD

455.50 EUR

#38

15 Oct 2013 02:12:02 UTC

-2.00000000 BTC

316.18 USD

227.78 EUR

#37

13 Oct 2013 21:03:42 UTC

-2.00000000 BTC

295.06 USD

211.26 EUR

#36

11 Oct 2013 21:23:33 UTC

-2.00000000 BTC

280.20 USD

204.02 EUR

#36

11 Oct 2013 21:23:33 UTC

-2.00000000 BTC

280.20 USD

204.02 EUR

Sum:

-4.00000000 BTC

560.40 USD

408.04 EUR

#35

08 Oct 2013 23:24:22 UTC

-2.00000000 BTC

272.98 USD

199.28 EUR

#35

08 Oct 2013 23:24:22 UTC

-2.00000000 BTC

272.98 USD

199.28 EUR

Sum:

-4.00000000 BTC

545.96 USD

398.56 EUR

#34

07 Oct 2013 08:26:25 UTC

-2.00000000 BTC

271.60 USD

198.90 EUR

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07 Oct 2013 08:26:25 UTC

-2.00000000 BTC

271.60 USD

198.90 EUR

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07 Oct 2013 08:26:25 UTC

-2.00000000 BTC

271.60 USD

198.90 EUR

#34

07 Oct 2013 08:26:25 UTC

-2.00000000 BTC

271.60 USD

198.90 EUR

Sum:

-8.00000000 BTC

1086.40 USD

795.60 EUR

# CASE STUDY 2: RANSOMWARE

## ► CONTEXTUALIZING THE DATA WITH *TAXONOMIES*

- Different country / sectors might use different nomenclature
- Suggestions of taxonomies for tagging:
  - adversary: adversary infrastructure
  - circl: Classification in Incident Response
  - enisa: ENISA structuring aid for information and threats
  - europol-\*: Describe the type of events or incidents
  - maec-\*: Malware Attribute Enumeration and Characterization
  - malware\_classification: Based on SANS malware 101
  - ms-caro-malware: Microsoft's Malware Type and Platform
  - ransomware: ransomware types and the elements
  - veris: Vocabulary for Event Recording and Incident Sharing
  - collaborative-intelligence: Support analysts
  - workflow: Support analysts
  - tlp: Traffic Light Protocol

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## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware. Contextualizing the data with *Taxonomies* ►

- Different country / sectors might use different nomenclature
- Suggestions of taxonomies for tagging:
  - adversary: adversary infrastructure
  - enisa: ENISA structuring aid for information and threats
  - europol-\*: Describe the type of events or incidents
  - maec-\*: Malware Attribute Enumeration and Characterization
  - malware\_classification: Based on SANS malware 101
  - ms-caro-malware: Microsoft's Malware Type and Platform
  - ransomware: ransomware types and the elements
  - veris: Vocabulary for Event Recording and Incident Sharing
  - collaborative-intelligence: Support analysts
  - workflow: Support analysts
  - tlp: Traffic Light Protocol

# CASE STUDY 2: RANSOMWARE

## ► CONTEXTUALIZING THE DATA WITH *TAXONOMIES*

### ■ Incident type

- `circl:incident-classification="ransomware"`
- `enisa:nefarious-activity-abuse="ransomware"`
- `europol-incident:malware="infection"`
- `europol-incident:malware="c&c"`
- `ms-caro-malware:malware-type="Ransom"`

### ■ Malware type

- `malware_classification:malware-category="Ransomware"`
- `ransomware:type="crypto-ransomware"`

### ■ Collaration and Sharing

- `collaborative-intelligence:request="extracted-malware-config"`
- `workflow:state="complete"`
- `tlp:green`

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## Mapping investigations and cases in MISp

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware. ► Contextualizing the data with *Taxonomies*

CASE STUDY 2: RANSOMWARE  
► CONTEXTUALIZING THE DATA WITH TAXONOMIES

- Incident type
  - `circl:incident-classification="ransomware"`
  - `enisa:nefarious-activity-abuse="ransomware"`
  - `europol-incident:malware="infection"`
  - `europol-incident:malware="c&c"`
  - `ms-caro-malware:malware-type="Ransom"`
- Malware type
  - `malware_classification:malware-category="Ransomware"`
  - `ransomware:type="crypto-ransomware"`
- Collaration and Sharing
  - `collaborative-intelligence:request="extracted-malware-config"`
  - `workflow:state="complete"`
  - `tlp:green`

# CASE STUDY 2: RANSOMWARE

## ► CONTEXTUALIZING THE DATA WITH *TAXONOMIES*

### ■ Infection vector

- `europol-event:dissemination-malware-email`
- `maec-delivery-vectors:maec-delivery-vector="email-attachment"`
- `ransomware:infection="phishing-e-mails"`

### ■ Adversary infrastructure

- `adversary:infrastructure-type="c2"`
- `veris:action:malware:variety="C2"`

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## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware. ► Contextualizing the data with *Taxonomies*

- Infection vector
  - `europol-event:dissemination-malware-email`
  - `maec-delivery-vectors:maec-delivery-vector="email-attachment"`
  - `ransomware:infection="phishing-e-mails"`
- Adversary infrastructure
  - `adversary:infrastructure-type="c2"`
  - `veris:action:malware:variety="C2"`

# CASE STUDY 2: RANSOMWARE

## ► CONTEXTUALIZING THE DATA WITH *TAXONOMIES*

### Malware-specific information

- `maec-malware-capabilities:maec-malware-capability="fraud"`
- `maec-malware-capabilities:maec-malware-capability="persistence"`
- `maec-malware-capabilities:maec-malware-capability="communicate-with-c2-server"`
- `maec-malware-capabilities:maec-malware-capability="compromise-data-availability"`
- `ransomware:element="ransomnote"`
- `ransomware:element="dropper"`
- `ransomware:complexity-level="file-restoration-possible-using-shadow-volume-copies"`
- `ransomware:complexity-level="file-restoration-possible-using-backups"`
- `ransomware:complexity-level="decryption-key-recovered-from-a-C&C-server-or-network-communications"`
- `ransomware:complexity-level="encryption-model-is-seemingly-flawless"`
- `ransomware:purpose="deployed-as-ransomware-extortion"`
- `ransomware:target="pc-workstation"`
- `ransomware:communication="dga-based"`
- `ransomware:malicious-action="asymmetric-key-encryption"`

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## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware. ► Contextualizing the data with *Taxonomies*

#### CASE STUDY 2: RANSOMWARE

##### ► CONTEXTUALIZING THE DATA WITH TAXONOMIES

###### Malware-specific information

- `maec-malware-capabilities:maec-malware-capability="fraud"`
- `maec-malware-capabilities:maec-malware-capability="persistence"`
- `maec-malware-capabilities:maec-malware-capability="communicate-with-c2-server"`
- `maec-malware-capabilities:maec-malware-capability="compromise-data-availability"`
- `ransomware:element="ransomnote"`
- `ransomware:element="dropper"`
- `ransomware:complexity-level="file-restoration-possible-using-shadow-volume-copies"`
- `ransomware:complexity-level="file-restoration-possible-using-backups"`
- `ransomware:complexity-level="decryption-key-recovered-from-a-C&C-server-or-network-communications"`
- `ransomware:complexity-level="encryption-model-is-seemingly-flawless"`
- `ransomware:purpose="deployed-as-ransomware-extortion"`
- `ransomware:target="pc-workstation"`
- `ransomware:communication="dga-based"`
- `ransomware:malicious-action="asymmetric-key-encryption"`



# CASE STUDY 2: RANSOMWARE

## ► CONTEXTUALIZING THE DATA WITH *TAXONOMIES*

### Tags

tlp:green x circl:incident-classification="ransomware" x  
 enisa:nefarious-activity-abuse="ransomware" x  
 europol-incident:malware="infection" x  
 europol-incident:malware="c&c" x  
 ms-caro-malware:malware-type="Ransom" x  
 malware\_classification:malware-category="Ransomware" x  
 ransomware:type="crypto-ransomware" x  
 workflow:state="complete" x  
 europol-event:dissemination-malware-email x  
 maec-delivery-vectors:maec-delivery-vector="email-attachment" x  
 ransomware:infection="phishing-e=mails" x

### ■ Danger of over-classification

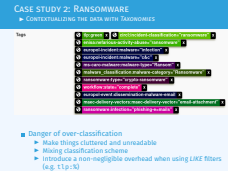
- Make things cluttered and unreadable
- Mixing classification scheme
- Introduce a non-negligible overhead when using *LIKE* filters (e.g. tlp:%)

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## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware. Contextualizing the data with *Taxonomies*



# CASE STUDY 2: RANSOMWARE

## ► CONTEXTUALIZING THE DATA WITH *TAXONOMIES*

Object name: file  
References: 6  
Referenced by: 1

Payload Installation    **malware-sample:**    *cryptolocker.exe*  
malware-sample    70f3bc193dfa56b78f3e6e4f800f701f

- ransomware:complexity-level="file-restoration-possible-using-shadow-volume-copies"
- ransomware:complexity-level="file-restoration-possible-using-backups"
- ransomware:complexity-level="decryption-key-recovered-from-a-C&C-server-or-network-communications"
- ransomware:complexity-level="encryption-model-is-seemingly-flawless"
- ransomware-purpose="deployed-as-ransomware-extortion"    ransomware-targets="pc-workstation"
- ransomware:communications="dga-based"
- ransomware:malicious-action="asymmetric-key-encryption"
- maec-malware-capabilities:maec-malware-capability="persistence"
- maec-malware-capabilities:maec-malware-capability="communicate-with-c2-server"
- maec-malware-capabilities:maec-malware-capability="compromise-data-availability"
- maec-malware-capabilities:maec-malware-capability="fraud"
- maec-delivery-vectors:maec-delivery-vector="email-attachment"

- Depending on the community, being complete on the contextualization can be useful for metrics and trends


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## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware. Contextualizing the data with *Taxonomies*

CASE STUDY 2: RANSOMWARE  
► CONTEXTUALIZING THE DATA WITH TAXONOMIES




■ Depending on the community, being complete on the contextualization can be useful for metrics and trends

# CASE STUDY 2: RANSOMWARE

## ► CONTEXTUALIZING THE DATA WITH *TAXONOMIES*

- Adding tags on attribute level make the role of the data clearer
- Make searches and exports easier

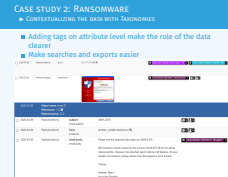
<input type="checkbox"/>	2022-03-29	Payload delivery	ip-src	81.177.170.166 🔍	<span>adversary:infrastructure-types="C2" x</span> <span>veris:action.malware:variety="C2" x</span>
<input type="checkbox"/>	2022-03-29	Artifacts dropped	attachment		<span>ransomware:element="ransomnote" x</span> <span>+</span> <span>+</span>
2022-03-29 Object name: email ⓘ References: 1 ⓘ ⓘ ⓘ Referenced by: 2 ⓘ ⓘ					
<input type="checkbox"/>	2022-03-28	Payload delivery	subject: email-subject	4829-2375	<span>+</span> <span>+</span>
<input type="checkbox"/>	2022-03-28	Payload delivery	from: email-src	andrew_ryan@rindustries.rp 🔍	<span>+</span> <span>+</span>
<input type="checkbox"/>	2022-03-29	Payload delivery	email-body: email-body	<p>Please see the attached Iolita report for 4829-2375.</p> <p>We received a check request in the amount of \$19,637.28 for the above referenced file. However, the attached report reflects a \$0 balance. At your earliest convenience, please advise how this request is to be funded.</p> <p>Thanks.</p> <p>Andrew Ryan *</p>	<span>ransomware:element="dropper" x</span>

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## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware. Contextualizing the data with *Taxonomies*



## CASE STUDY 2: RANSOMWARE

### ► CONTEXTUALIZING THE DATA WITH *GALAXY CLUSTERS*

- Note: Different country / sectors might use different nomenclature
- Suggestions for tagging with Galaxies:
  - Malpedia
  - Ransomware
  - MITRE Att&ck Pattern
  - Preventive Measure

2022-03-30

## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware. Contextualizing the data with ► *Galaxy Clusters*

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# CASE STUDY 2: RANSOMWARE

## ► CONTEXTUALIZING THE DATA WITH *GALAXY CLUSTERS*

### Galaxies

#### Malpedia Q

🔍 CryptoLocker Q ⓘ 🗑

#### Ransomware Q

🔍 CryptoLocker Q ⓘ 🗑

#### Attack Pattern Q

🔍 Modify Registry - T1112 Q ⓘ 🗑

🔍 Registry Run Keys / Startup Folder - T1547.001 Q ⓘ 🗑

🔍 File and Directory Discovery - T1083 Q ⓘ 🗑

🔍 Domains - T1583.001 Q ⓘ 🗑

🔍 Peripheral Device Discovery - T1120 Q ⓘ 🗑

🔍 Web Protocols - T1071.001 Q ⓘ 🗑

🔍 Bidirectional Communication - T1102.002 Q ⓘ 🗑

🔍 Standard Encoding - T1132.001 Q ⓘ 🗑

🔍 Malicious File - T1204.002 Q ⓘ 🗑

🔍 Spear phishing messages with malicious attachments - T1367 Q ⓘ 🗑

🔍 Data Encrypted for Impact - T1486 Q ⓘ 🗑

🔍 Credentials in Registry - T1552.002 Q ⓘ 🗑

🔍 Asymmetric Cryptography - T1573.002 Q ⓘ 🗑

🔍 Virtual Private Server - T1583.003 Q ⓘ 🗑

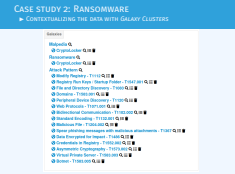
🔍 Botnet - T1583.005 Q ⓘ 🗑

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Mapping investigations and cases in MISP

└ Case study 2: Ransomware

└ Case study 2: Ransomware.  
Contextualizing the data with *Galaxy Clusters* ►



## ► CONTEXTUALIZING THE DATA WITH GALAXY CLUSTERS

Initial access (19 items)		Privilege escalation (101 items)		Defense evasion (168 items)		Credential access (58 items)		Discovery (42 items)		Lateral movement (33 items)		Collection (38 items)		Command and control (40 items)		Exfiltration (17 items)		Impact (26 items)	
Cloud Accounts	Malicious File	Registry Run Keys / Startup Folder	Registry Run Keys / Startup Folder	Modify Registry	Credentials in Registry	File and Directory Discovery	Peripheral Device Discovery	Application Access Token	Component Object Model and Distributed COM	Adversary-in-the-Middle	ARP Cache Poisoning	Bidirectional Communication	Data Transfer Size Limits	Account Access Removal					
Compromise Hardware Supply Chain	AppleScript	.bash_profile and .bashrc	.bash_profile and .bashrc	Abuse Elevation Control Mechanism	/etc/passwd and /etc/shadow	Account Discovery	AS-REP Roasting	Exploitation of Remote Services	Distributed Component Object Model	Archive Collected Data	Web Protocols	Exfiltration Over Alternative Protocol	Application Exhaustion Flood						
Compromise Software Dependencies and Development Tools	AI (Linux)	Accessibility Features	Access Token Manipulation	Application Access Token	AS-REP Roasting	Application Window Discovery	Browser Bookmark Discovery	Internal Spearphishing	Archive via Library	Application Layer Protocol	Exfiltration Over Bluetooth	Data Destruction							
Compromise Software Supply Chain	AI (Windows)	Account Manipulation	Access Token Manipulation	Application Access Token	AS-REP Roasting	Application Window Discovery	Lateral Tool Transfer	Archive via Utility	Commonly Used Port	Exfiltration Over C2 Channel	Data Manipulation								
Default Accounts	Command and Scripting Interpreter	Active Setup	Accessibility Features	Asynchronous Procedure Call	Adversary-in-the-Middle	Browser Bookmark Discovery	Internal Spearphishing	Archive via Library	Application Layer Protocol	Exfiltration Over Bluetooth	Data Destruction								
Domain Accounts	Component Object Model	Add Office 365 Global Administrator Role	Active Setup	BITS Jobs	Bash History	Cloud Account	Lateral Tool Transfer	Archive via Utility	Commonly Used Port	Exfiltration Over C2 Channel	Data Manipulation								
Drive-by Compromise	Component Object Model and Distributed COM	Add-ins	AppCert DLLs	Binary Padding	Brute Force	Cloud Groups	Pass the Hash	Audio Capture	Communication Through Removable Media	Exfiltration Over Other Network Medium	Defacement								
Exploit Public-Facing Application	Container Administration Command	Additional Cloud Credentials	AppInit DLLs	Bootkit	Cached Domain Credentials	Cloud Infrastructure Discovery	Pass the Ticket	Automated Collection	DNS	Exfiltration Over Physical Medium	Direct Network Flood								
External Remote Services	Container Orchestration Job	AppCert DLLs	Application Shimming	Build Image on Host	Cloud Instance Metadata API	Cloud Service Dashboard	RDP Hijacking	Browser Session Hijacking	DNS Calculation	Exfiltration Over Symmetric Encrypted Non-C2 Protocol	Disk Content Wipe								
Hardware Additions	Cron	AppInit DLLs	Asynchronous Procedure Call	Bypass User Account Control	Container API	Cloud Service Discovery	Remote Desktop Protocol	Clipboard Data	Data Encoding	Exfiltration Over Unencrypted/Obfuscated Non-C2 Protocol	Disk Structure Wipe								

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## Case study 2: Ransomware

- Case study 2: Ransomware. Contextualizing the data with *Galaxy Clusters*

## CASE STUDY 2: RANSOMWARE

► CONTEXTUALIZING THE DATA WITH GALAXY CLUSTERS

MITRE ATT&CK Matrix

The image displays a screenshot of the MITRE ATT&CK Matrix. The matrix is organized into columns representing different attack phases: Initial Access, Execution, Persistence, Privilege Escalation, Defense Evasion, Credential Access, Discovery, Lateral Movement, Collection, Exfiltration, and Impact. The rows represent specific attack techniques, such as Phishing, Malware, Remote Services, and others. The matrix is color-coded, with red highlighting certain techniques and blue highlighting others. The MITRE logo is visible in the top left corner.

# CASE STUDY 2: RANSOMWARE

## ► MITIGATIONS AND DETECTION

Thanks to the MITRE Att&ck contextualization, we can derive preventive measures from their catalogue.  
Just to name a few

### ■ Mitigations

- Restrict Registry Permissions
- Antivirus/Antimalware
- Network Intrusion Prevention
- Restrict Web-Based Content
- Software Configuration

### ■ Detection

- Application Log
- Command
- Network Traffic
- Process
- Windows Registry

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## Mapping investigations and cases in MISp

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware and Detection ► Mitigations

Thanks to the MITRE Att&ck contextualization, we can derive preventive measures from their catalogue.  
Just to name a few

- Mitigations
  - Restrict Registry Permissions
  - Antivirus/Antimalware
  - Network Intrusion Prevention
  - Restrict Web-Based Content
  - Software Configuration
- Detection
  - Application Log
  - Command
  - Network Traffic
  - Process
  - Windows Registry

## CASE STUDY 2: RANSOMWARE

### ► WRITE-UP WITH AN *EVENT REPORT*

- Create the *event report* with a concise name
- Example: Executive summary of the case
  - Leave its content empty as it can be edited with more ease in the editor afterward
- Write a summary with
  - Quick chronology
  - Written explanation of the steps tooks by the ransomware
  - Reference to existing *attributes* or *objects* whenever possible
    - The special syntax is: @[scope]{uuid}

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## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware an *event report* ► Write-up with

CASE STUDY 2: RANSOMWARE

► Write-up with an event report

- Create the event report with a concise name
- Example: Executive summary of the case
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- Write a summary with
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    - The special syntax is: @[scope]{uuid}



# CASE STUDY 2: RANSOMWARE

## ► WRITE-UP WITH AN *EVENT REPORT*

- We could have one technical report and another report for the incident

Event Reports				
<a href="#">+ Add Event Report</a> <a href="#">🔗 Import from URL</a> <a href="#">📄 Generate report from Event</a> <span>All</span> <span>Default</span> <span>Deleted</span>				
ID	Name	Last update	Distribution	Actions
73	Executive summary of the incident	2022-03-29 14:02:53	This community only	👁️ 🗑️
72	Technical details about the ransomware	2022-03-29 13:57:13	Inherit event	👁️ 🗑️

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## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware an *event report*

### ► Write-up with



## ► WRITE-UP WITH AN *EVENT REPORT* (TECHNICAL)

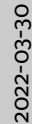
The ransomware in question seems to be an early version of the [ransomware -> CryptoLocker](#) ransomware, or at least an extremely close version.

Distributed through spam or spearphishing emails. In this case, the mail [email](#) Please see the attached lola report for 4829-2375... was sent to lure the victim to read it and get infected. The ransomware payload [file](#) cryptolocker.exe was attached to the mail with a PDF icon and relied on the fact that Windows hides the extensions of known file to get the user to execute it once it's opened.

Cryptolocker hides its presence from the victims until it has successfully contacted the command and control (C2) server `ip-sec 61.177.170.166`. Prior to this action, the malware ensures its persistence by copying itself and adding an autorun registry key `registry-key "CryptoLocker"`. It also store additional configuration data such as the C2 address `ip-sec 61.177.170.166`, the malware version and installation timestamp in another registry key `registry-key VersionInfo`. This registry key is encoded with the key `crypto-material 019C33AE`.

The malware try to contacts the C2 server and once successful recover the RSA public-key (generated by the C2) used to encrypt the files on the victim's computer.

Once the malware has its public-key, it begins the encryption process by enumerating files and encrypting it. A small amount of metadata and the encrypted file contents are then written back to disk, replacing the original files. Encrypted files can only be recovered by obtaining the RSA private key held exclusively by the threat actors. After finishing the file encryption process, Cryplocker displays a window containing instructions on how to decrypt the file by paying the ransom as seen in the picture below:



## Case study 2: Ransomware

## Case study 2: Ransomware an *event report* (technical)

► Write-up with



# CASE STUDY 2: RANSOMWARE

## ► WRITE-UP WITH AN *EVENT REPORT* (TECHNICAL)

### Payment

The ransom amount is set to 2 BTC to be transferred on the bitcoin address `38e1KPf2Bvix3ZPhuJDMv33APqB8M8pUgCh` before the countdown timer expires. According to the ransomware, the private key associated to the public key is not done, rendering the decryption of the files impossible.

### Ransomware details

Delivery	<code>masc-delivery-vectors masc-delivery-vector email-attachment</code>
Complexity Level	<code>ransomware-complexity-level file-restoration-possible-using-shadow-volume-copies</code> <code>ransomware-complexity-level file-restoration-possible-using-backups</code> <code>ransomware-complexity-level disruption-key-recovered-from-a-C&amp;C-server-or-network-communications</code> <code>ransomware-complexity-level encryption-model-is-seemingly-flawless</code>
Purpose	<code>ransomware-purpose deployed-as-ransomware-variant</code>
Malicious Action	<code>ransomware-malicious-action payment-to-key-encryption</code>
Capability	<code>masc-malware-capabilities masc-malware-capability persistence</code> <code>masc-malware-capabilities masc-malware-capability trust</code> <code>masc-malware-capabilities masc-malware-capability communicate-with-C&amp;C-server</code> <code>masc-malware-capabilities masc-malware-capability compromise-data-availability</code>

### Mitigation

#### Techniques and MITRE ATT&CK

- `mitre-attack-pattern = Belfort - T1563.000`
- `mitre-attack-pattern = Domains - T1563.001`
- `mitre-attack-pattern = Virtual Private Server - T1563.003`
- `mitre-attack-pattern = Spear phishing messages with malicious attachments - T1567`
- `mitre-attack-pattern = Malicious File - T1564.002`
- `mitre-attack-pattern = Registry Run Keys - Startup Folder - T1547.001`
- `mitre-attack-pattern = Data Encrypted for Impact - T1485`
- `mitre-attack-pattern = File and Directory Discovery - T1565`
- `mitre-attack-pattern = Asymmetric Cryptography - T1573.002`
- `mitre-attack-pattern = Bidirectional Communication - T1102.002`
- `mitre-attack-pattern = Standard Encoding - T1132.001`
- `mitre-attack-pattern = Web Protocols - T1071.001`
- `mitre-attack-pattern = Credentials in Registry - T1052.002`
- `mitre-attack-pattern = Modify Registry - T1112`
- `mitre-attack-pattern = Peripheral Device Discovery - T1130`

Initial access (C2 item)	Execution (C2 item)	Persistence (C2 item)	Privilege escalation (C2 item)	Defense evasion (C2 item)	Credential access (C2 item)	Discovery (C2 item)	Lateral movement (C2 item)	Collection (C2 item)	Command and control (C2 item)	Communication (C2 item)	Impact (C2 item)
Cloud Accounts	Malicious File	Registry Run Keys / Startup Folder	Registry Run Keys / Startup Folder	Mostly Registry	Credentials in Registry	File and Directory Discovery	Application Access Token	APP Cache Poisoning	Asymmetric Cryptography	Automated Exfiltration	Data Encrypted for Impact
Compromise	AppleScript	bash_profile	bash_profile	Abuse Elevation	Inter-passed and	Peripherals	Component	Adversary in-	Redirection	Data Transfer	Account Access

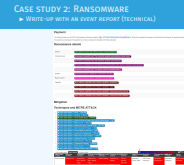
2022-03-30

## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

### └ Case study 2: Ransomware an *event report* (technical)

### ► Write-up with

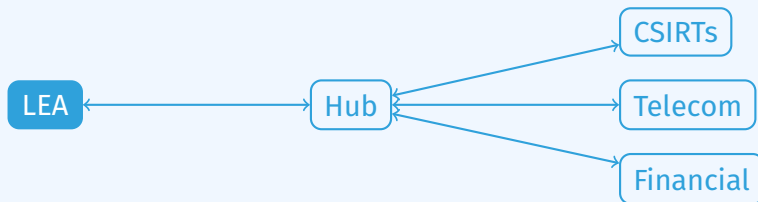


## CASE STUDY 2: RANSOMWARE

### ► REVIEW THE DISTRIBUTION LEVEL AND PUBLISH

In our case, we consider the following MISP network topology

- The current instance is owned and managed by a LEA
- The current instance is connected to a central MISP instance acting as a "Hub"
- The "Hub" is connected to various other MISP instances such as other LEAs, CSIRTs, Financial and telecom institutions



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## Mapping investigations and cases in MISP

### └ Case study 2: Ransomware

└ Case study 2: Ransomware distribution level and publish ► Review the

CASE STUDY 2: RANSOMWARE  
► REVIEW THE DISTRIBUTION LEVEL AND PUBLISH

In our case, we consider the following MISP network topology

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- The current instance is connected to a central MISP instance acting as a "Hub"
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```
graph LR; LEA[LEA] <--> Hub[Hub]; Hub --> CSIRTs[CSIRTs]; Hub --> Telecom[Telecom]; Hub --> Financial[Financial];
```

## CASE STUDY 2: RANSOMWARE

► REVIEW THE DISTRIBUTION LEVEL AND PUBLISH

- binary file: **All communities**
- C2 ip & geolocation: **All communities**
- crypto-material & registry-keys: **All communities**
- person: **All communities**
  - Even though Andrew Ryan could be a victim due to impersonation, it's very likely that it's a fake name
  - The email address `andrew_ryan@rindustries.rp` should be considered as an IoC

→ **Publish the event!**

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Mapping investigations and cases in MISP

└ Case study 2: Ransomware

└ Case study 2: Ransomware  
distribution level and publish ► Review the

CASE STUDY 2: RANSOMWARE

► REVIEW THE DISTRIBUTION LEVEL AND PUBLISH

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