T861: POINT & TAG IDENTIFICATION

PURPOSE

This Recipe, based upon use of the CyOTE methodology¹ (Figure 1), provides asset owners and operators (AOO) with general guidance for confirming suspicion of the Point & Tag Identification attack technique for the Collection tactic as defined by the MITRE ATT&CK® for Industrial Control Systems (ICS) framework².³ allowing them to be able to make informed business decisions based on collaborative analysis of the nature and context of the attack. This document also includes supplemental material with suggestions and recommendations for securing assets and improving detection capabilities. Additional information on this technique can be found in the Point & Tag Identification (T861) Technique Detection Capability Sheet for the Collection tactic.⁴

POTENTIAL ATTACK TARGETS

As defined by the MITRE ATT&CK® for ICS framework, the Point & Tag Identification technique occurs when adversaries collect device characterizations from industrial devices. Per MITRE’s definition, point data includes “values such as inputs, memory locations, outputs or other process specific variables” while tags include “identifiers given to points for operator convenience.”⁵ Point & tag identification provides an attacker with device information useful for reconnaissance or for later stages of attack to confirm changes within an environment.

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PERCEPTION: IDENTIFYING ANOMALIES

Perception (Figure 2) is the first active step in employing CyOTE’s methodology. CyOTE uses the terms “perception” and “comprehension” as opposed to terms like “detection” and “understanding.” This nomenclature follows the North American Electric Reliability Corporation (NERC) nomenclature, which was adapted from Dr. Mica Endsley’s model of situation awareness—these terms cause the reader to think of the necessary individual and organizational human cognition as opposed to merely automated data processing. Perception is defined as a signature capable of being detected by a human; perception does not mean opinion or subjective interpretation. It provides the starting point—detection of a triggering event in the organization—for investigation during the comprehension step. This stage involves the identification of observables, anomalies, and triggering events of a potential malicious event; please consult the CyOTE methodology for more information on these terms.

EXAMPLE OBSERVABLES AND ANOMALIES OF THE POINT & TAG IDENTIFICATION TECHNIQUE

Differences between operational environments require AOOs to understand the generic and unique attributes of the environment under analysis. The anomalies and observables in Table 1 serve as a generic starting point to adapt to the realities of the specific environment. Each potential anomaly includes data sources where it may be observed, as well as what the observables may be.

Note that this table is not intended to be an exhaustive list of anomalies, data sources, or observables tied to the Point & Tag Identification technique.

Table 1: Notional Events

<table>
<thead>
<tr>
<th>Observables</th>
<th>Anomalies</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>● An unauthorized or unexpected application on an endpoint might be observed sending point and tag queries.</td>
<td>Point and tag collection requests by unauthorized applications</td>
<td>● Windows Event Logs (Standard)</td>
</tr>
<tr>
<td>● The combination of network traffic and associated endpoint socket metadata might reveal ICS focused malware.</td>
<td></td>
<td>● Windows Event Logs (Enhanced)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Raw Host Data (Memory)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Raw Network Data (Captured)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Raw Network Data (Live)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Network Flow Data (Captured)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Network Flow Data (Live)</td>
</tr>
</tbody>
</table>

## Observables

- Manual attacker actions might also be observed through this anomaly if an attacker leverages native applications or programming languages. An attacker generating point & tag identification request using python’s DNP3 or Modbus libraries provide one example of manual attacker point & tag identification actions.

<table>
<thead>
<tr>
<th>Anomalies</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unauthorized or suspicious point and tag collection requests by a host</td>
<td>Raw Network Data (Captured)</td>
</tr>
<tr>
<td></td>
<td>Raw Network Data (Live)</td>
</tr>
<tr>
<td></td>
<td>Network Flow Data (Captured)</td>
</tr>
<tr>
<td></td>
<td>Network Flow Data (Live)</td>
</tr>
</tbody>
</table>

- A new or unexpected host sending point and tag-reads to industrial devices that break the expected network traffic baseline might indicate malicious point & tag identification actions.
- A change in the standard traffic pattern from a device expected to send point & tag identification might also indicate malicious point and tag identification activity.
- This activity would be detected once a baseline of expected network traffic flow is identified.

## STEPS FOR IDENTIFYING HIGH-CONSEQUENCE SYSTEMS, PATHWAYS, AND POTENTIAL ANOMALOUS POINT & TAG IDENTIFICATION

Asset owners and operators aiming to develop potential capabilities to monitor for use of the Point & Tag Identification technique should consider a phased approach to development of the monitoring capability, to include continuous testing and evaluation throughout capability’s life cycle. To complement this, it is highly encouraged to use the following steps to map out existing OT infrastructure both logically and physically. This supports capability development and the analysis of potential alerts, enabling the quick identification of control devices communicating within the infrastructure.

Continual testing and evaluation will ensure the newly introduced software does not negatively impact, adversely affect, or introduce vulnerabilities into the existing OT environment. As a guideline, during the development phase, secure coding practices should be employed.8

1. Identify what devices and protocols to monitor for Point & Tag Identification
   a. E.g., remote terminal units (RTU)/automation controllers, programmable logic controllers (PLC)

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b. Identify parsers for the applicable protocols of each potential trigger

2. Identify the capability location and when it will operate
   a. Example capability locations: from firewall, integrated host, server, intrusion detection systems (IDS), intrusion prevention systems (IPS)
   b. Example operating timeframes: at startup, real-time, daily, weekly

3. Identify tap points (sensors) for observing device traffic for identified devices
   a. This may include servers, switches, security appliances, and logging locations (hosts)
      i. Plan sensor placement based on locations within the architecture that provide context related to the anomaly and prioritize systems at greater risk
   b. Monitoring and traffic aggregation may necessitate tap placement on both sides of the identified devices
      i. E.g., media access control (MAC) addresses may change as information traverses networking infrastructure like protocol converters
   c. Recommend establishing capture requirements for monitoring OT traffic and their locations\textsuperscript{9, 10}
      i. Storage (how much and for how long)
      ii. Line rate (e.g., 1/10/40/100 Gb)
      iii. Live stream data or full Packet Capture (PCAP) offline
      iv. Central versus distributed collection/analysis/alerting

4. Identify business processes that support identification of Point & Tag Identification
   a. Identify opportunities where plant personnel or other network and device users would identify signs of technique occurrence
   b. Identify operational data stores that might assist with confirmation of technique identification
      i. Help desk tickets related to technique
      ii. Plant maintenance tickets related to technique
      iii. Unusual behaviors or actions that plant personnel or a network user would observe related to the technique

\textsuperscript{10} CESER, Lessons Learned, CyOTE Program, Department of Energy, 2021.
COMPREHENSION: ANALYZING TRIGGERS AND THEIR CONTEXT

The second step of employing the CyOTE methodology is Comprehension (Figure 3). Comprehension is the ability to understand an anomaly in all its relevant context across the operations, OT, information technology (IT), business, and cybersecurity domains. Comprehension involves understanding the nature and possible origins of the anomaly and developing broader awareness of the overall context in which the triggering event came to be. Because of the multidisciplinary approach used for a sufficient investigation, comprehension for the purposes of CyOTE is an organizational ability, not an individual one.

IDENTIFY AND COLLECT AVAILABLE INFORMATION RELATING TO POINT & TAG IDENTIFICATION

Developing comprehension around an anomaly is most effective and efficient when small core teams of full-time system operators, OT technicians, and cybersecurity analysts from different departments and external resources come together to purposefully focus on the problem in the context of their shared organization. Table 2 includes a list of different organizations that could be leveraged to collect information on an anomaly. Depending on the size and resources of your organization, some of these resources might not be applicable.

Table 2: Business Organizations that Support Information Collection for Point & Tag Identification

<table>
<thead>
<tr>
<th>Organization</th>
<th>Capacity</th>
</tr>
</thead>
</table>
| ● System Operations Departments  
● Engineering Departments | Control center field operators and real-time engineers should be one of the first sources consulted. Information collected might include manual logs, notes from field personnel investigations, or other records if the anomaly involved a disruption in the system above some established threshold. |
| Cybersecurity Departments                         | Includes those responsible for the confidentiality, integrity, and availability of the organization’s digital assets provide the threat-informed perspective and bring experience and capabilities to analyze situations and data for security issues. |
| Original Equipment Manufacturers (OEM)            | Includes those who produce and support the hardware and software present within the industrial environment. OEMs might or might not be under support contracts but might |
Since access to raw data typically requires coordination with human organizational oversight, it generally is better to pursue information and context from different departments within the organization. When needed, have them provide the identified data under their control for shared analysis. Appendix A provides specific datasets and information that could be helpful depending on the situation.

**STEPS FOR IDENTIFYING AND EXTRACTING INFORMATION FROM OT DATA FOR ANALYSIS OF POINT & TAG IDENTIFICATION**

The information on high-consequence systems, pathways, and potential anomalies identified previously becomes more refined for collection in this process. Extracted information should be prioritized based on importance, with timelines established for capturing and holding information for analysis and review.

Suggested data fields to collect include:

- Timestamp
- Device Identifier (will vary based on environment)
  - Source and destination IP addresses
  - MAC addresses
- Messages
- Program payload
- Payload size (e.g., bytes)
- NetFlow records
- Firewall logs

**STEPS FOR ANALYZING ANOMALIES FROM PARSED DATA FOR POINT & TAG IDENTIFICATION**

The suggested fields above are applied to data analysis and used to help establish anomalies. The list below includes suggested ways to use the extracted fields to help identify anomalies that could be alerted on. Any message revealing two or more parameters is given greater precedence for analysis and correlation with other observables to identify potential anomalies.

1. Identify enumeration and information request packets of interest to alert on
   a. Document anomalies based on host
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1. Identify the existing traffic origination points
   ii. Include the frequency and type of packets

b. Identify and match packets to high-risk devices with criticality to the physical process
   i. Determine if the alert is valid or invalid based on analysis of the message parameters and source(s)

2. Identify enumeration and information request packets coming from new or abnormal hosts
   a. Conduct a comparative analysis to identify new connections and alerts versus older ones
   b. Determine whether system discovery packets are occurring at an abnormal frequency
      i. E.g., frequency, order, type, messaging timing
      ii. Track system discovery packets and perform statistical and/or procedural tests

3. Establish anomalies
   a. Incorporate the analysis findings provided in Step 3 and implement to refine alert parameters to focus on the useful information and minimize the number of non-useful alerts
      i. E.g., abnormal system discovery packets received, high-risk devices being probed from external sources

REPORTING TRIGGERING EVENTS

Security needs to consider the operational and business aspects of the organization. Timely reporting of anomalous activity reduces the time needed to comprehend triggering events and make a decision, leading to reduced process outage times. The following guidance aims to enhance your organization's existing reporting procedures, although these guidelines might also vary based on the composition of your organization. If your industry or organization requires stricter timeframes or processes, you should default to the more stringent timeframe and procedures.

Programmatic alarms should already be logging information, but organizations should document any contextual information for further analysis and reporting. Organizations should also report unusual operating conditions not based on programmatic alarms. Examples of essential details to record include the usual and intended conditions and how the observed operating condition deviates from expected. Table 3 below provides reporting guidelines for a sample of triggering events but is by no means an exhaustive list.

<table>
<thead>
<tr>
<th>What To Report</th>
<th>Whom To Report To</th>
<th>Recommended Timeframe</th>
<th>Desired Outcome</th>
</tr>
</thead>
</table>
| Suspicious point & tag identification request from a suspicious subnet or host | ● Network security team  
● The team responsible for network resource | 24 business hours | ● Identify if the source(s) associated with the request should be making point & tag requests  
● Identify if boundary devices allowed |
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<table>
<thead>
<tr>
<th>What To Report</th>
<th>Whom To Report To</th>
<th>Recommended Timeframe</th>
<th>Desired Outcome</th>
</tr>
</thead>
</table>
| Suspicious applications discovered making unauthorized point & tag identification requests | ● Network security team  
● The team responsible for endpoint                         | 24 business hours | ● Identify applications making point & tag identification requests  
● Determine the user associated with the application and investigate if actions were expected  
● Look for additional hosts impacted by or associated with the event |

ANALYZE INFORMATION AND CONTEXT COLLABORATIVELY

Documentation and Knowledge Management Process

Begin a documentation and knowledge management process in support of the investigation. Start with a determination of perceived actions in the triggering event. Did the change occur within:

- The physical domain (something involving telemetered quantities such as noise, voltage, current, frequency, or temperature, or the physical configuration of a piece of infrastructure); or
- The OT domain (something involving traffic or signals transiting a communication medium, or the logical configuration of a piece of infrastructure, or something involving memory/storage metrics); or
- Both the physical and the OT domains?

Given the determination of a physical or OT starting point, identify what expected corresponding, perceptible observables would exist in the other domain and search for their presence or absence. For example, an unplanned file server reboot initiated by a program that was downloaded might produce digital footprints like logs and errors. It might correspond to data loss, unauthorized configuration changes, elevated user permissions, or account activity at unusual hours.
Technical Analysis

To differentiate between expected point & tag identification requests requires context into the normal
access patterns and metadata. Notably, technical analysis will need to occur at host and network
collection points where an attacker can collect the data needed to validate the authenticity of an attack.
Technical analysis should begin with the identification of where collection needs to occur.

Context Building Questions

Context building should focus on development of known good access patterns and behaviors. Point & tag
identification on requests from hosts expected to communicate might not immediately trigger concern or
meet the threshold of analysis. Context building should focus on honing the thresholds of good vs bad in
order to develop a deeper understanding of the specific thresholds that work in your particular
environment.

- What hosts and users typically send point & tag identification requests?
- What is the typical frequency of point & tag identification requests?
- What applications on an endpoint should send point & tag identification requests? Compare this
to actual applications that send point & tag identification requests to determine if the requests
originate from an expected application.

Ultimately, separating nefarious point & tag identification requests might not be straightforward unless
the hosts involved deviate significantly from the “known good” model.

Visual Information Modeling

Enumerate all the lines of questioning identified through this stage of the analysis of the anomaly. At this
point, it is beneficial to begin a node and link diagram from the information documented in the knowledge
management processes to help visualize relationships between observables; the CyOTE program
colloquially refers to this observable linking diagram as a “worm diagram.”

The triggering event is the first node, with all its related observables radially connected to it; include both
confirmed observables and observables that were expected but not found, with some sort of visual
discriminator between presence and absence (e.g., solid or dashed lines). Highlight the triggering event if
the event relates to the implementation of a specific adversary technique. Include links emanating from
the triggering event representing the as-yet-unanswered questions considered, as well as links and
additional nodes for answered questions that confidently satisfy the extent of a particular line of inquiry.
A notional example11 of this diagram for an investigation in progress is shown in Figure 4.

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11 Current CyOTE Case Studies do not include an analysis on the use of this technique in a historical attack; thus, there is no link diagram specific
to this technique at this time.
INVESTIGATE POTENTIALLY RELATED ANOMALIES TO POINT & TAG IDENTIFICATION

After an anomaly has been comprehended sufficiently and mapped to a technique, repeat the steps above, starting from each questioning line resulting from the initial anomaly analysis. The importance of recording and organizing the information discovered in the comprehension process and visualizing it through a node and link diagram becomes exponentially more important as the first perceived anomaly expands into a web of postulated, confirmed, and denied relationships.

DECISION: REMEDIATING THE CAUSE AND EFFECTS OF A TRIGGERING EVENT

The last step of the CyOTE methodology is the Decision step (Figure 5). In this step, the AOO makes a risk-informed business decision on how to proceed based on the information gathered in the previous steps. The level of comprehension and detail needed to make the decision will vary from company to company and may be related to resource availability. The length and consistency of a discovered and comprehended “worm diagram” representing a prospective kill chain fragment needed to decide to proceed with incident response will also vary based on a company’s risk tolerance.

INCIDENT RESPONSE

In situations where there is sufficient belief that the anomalies perceived and comprehended indicate possible malicious cyber activity, the appropriate organizational action is to initiate a cybersecurity incident response process according to established policy and procedures. The information and context
developed through the application of the CyOTE methodology will be helpful to incident handlers for developing and implementing appropriate mitigating actions. Consult with your organization’s incident response procedures for the next steps.

CORRECTIVE MAINTENANCE

When analysis fails to establish a reasonable indication of malicious cyber activity, the next step is to determine if the anomalies indicate that a non-malicious failure is occurring. One appropriate action involves resolving any deficiencies discovered through corrective maintenance and work management processes according to organizational policy and procedures. It is worthwhile to maintain records of these situations for future reference and comparison to subsequent anomalies. Consult with your organization’s engineers, operators, and other parties responsible for maintenance in your environment. For vendor-supported devices, coordinate with external parties when necessary.

IMPROVING SECURITY CAPABILITIES

Prevention and preparation include proactive measures to reduce the risk or likelihood of an attack or enable an organization to respond more rapidly. Preventive actions may raise the cost of an attack, which could deter the attacker from an act or eliminate the possibility that specific attack paths would be used altogether. AOOs should develop and deploy data collection management strategies to prepare for the collection of data needed to detect this technique and properly analyze potentially anomalous triggers.

CONTROL MATRIX FOR POINT & TAG IDENTIFICATIONS

The control matrix (Table 4) is a technical capability or system designed to prevent or sabotage specific attack techniques used by malicious actors. The control matrix assists with the identification of detection capability improvement areas.

Table 4: Control Matrix

<table>
<thead>
<tr>
<th>Control</th>
<th>Matrix</th>
<th>Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inbound Traffic Filtering</td>
<td>MITRE D3FEND: D3-ITF 12</td>
<td>Network segmentation divides your network into sections based on manufacturer specification, role, or by the design of your organization. Network traffic filtering and inbound traffic filtering applies a set of rules at different points in the network or on a host to stop the communication of packets that meet a given signature. Network allowlists can also be</td>
</tr>
<tr>
<td>Network Segmentation</td>
<td>MITRE ATT&amp;CK for ICS: M0930 13</td>
<td></td>
</tr>
</tbody>
</table>

### Control

<table>
<thead>
<tr>
<th>Control</th>
<th>Matrix</th>
<th>Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter Network Traffic</td>
<td>MITRE ATT&amp;CK for ICS: M0937&lt;sup&gt;14&lt;/sup&gt;</td>
<td>used to block traffic based on traffic metadata such as IP address, ports, time, or other fields within a given communication stream.</td>
</tr>
</tbody>
</table>
| Network Allowlists                   | MITRE ATT&CK for ICS: M0807<sup>15</sup>  | • Limit hosts that can send point & tag identification requests to only essential network segments  
• Monitor for unauthorized requests across subnet boundaries |
| Network Traffic Community Deviation  | MITRE D3FEND: D3-NTCD<sup>16</sup>         | Network traffic community deviation and protocol metadata anomaly detection consider the metadata and contents of traffic transiting the network. Malicious point & tag identification requests might deviate significantly from expected traffic patterns and protocol metadata patterns. |
| Protocol Metadata Anomaly Detection  | MITRE D3FEND: D3-PMAD<sup>17</sup>         | • Identify changes to the traffic baseline for a given network. Due to the challenging nature of differentiating good point & tag identification requests from malicious ones, your traffic baseline might need to be continually monitored and tuned in order to be effective. |

### TESTING, DEPLOYING, AND REFINING ALERTING PARAMETERS FOR POINT & TAG IDENTIFICATION

The parameters and established anomalies from previous analysis lead to the continual testing and gradual deployment of the capability and evaluation of alerts. The resulting output functions and considerations are realized during this process, the products of which are sent to output destination(s) in selected format(s).

1. Validate triggers and alerts
   a. Ensure the capability does not conflict with existing monitoring functionality
   b. Ensure the capability does not adversely impact the existing environment
   c. Test alerting functions
      i. Use synthetic data (e.g., PCAPs containing point & tag identifications)
      ii. If the test fails, re-evaluate the steps taken iteratively (line by line)
      iii. If successful, enact a graduated deployment schedule and retest for each iteration
   d. Consider communication criteria for multiple locations and information consolidation during graduated deployment

2. Identify output destination(s) (e.g., SIEM, Splunk, Gravwell, Elk)
   a. Identify output format(s) (e.g., STIX, Syslog, JSON, CSV)
   b. Define actionable data requirements, processes, and responses
      i. Logging
      ii. Alert content
      iii. Alert response(s) (local or SOC)

3. Identify what information to log (long-term/short-term)
   a. The aggregation of different log types may assist in identifying potentially anomalous behaviors within OT environments

The overall output of this process may result in one of the following: script, application, YARA rule, SIEM plugin, or another tool capable of identifying and alerting on the use of the Point & Tag Identification technique within OT environments.

CONCLUSION

By employing the strategies in each step of the CyOTE methodology outlined in this Recipe, AOOs will be able to develop a capability to read and analyze their OT traffic and determine whether the Point & Tag Identification technique is being used as part of a malicious cyber-attack.

Through the Perception step, the AOO identifies observables and anomalies indicative of the Point & Tag Identification technique. Determining the associated observables and potential data sources for these anomalies will give the AOO the basis they need to begin comprehending the context in which a triggering event involving the Point & Tag Identification technique came to be. Manual point & tag identification, unauthorized or unexpected applicants on an endpoint sending point & tag identification enquiries, and changes to traffic patterns from devices expected to send point & tag identification are all potential observables that could indicate the use of the Point & Tag Identification technique. Anomalies tied to these observables could be unauthorized applications performing point & tag identification requests or unauthorized or suspicious collection requests by a host.

The Comprehension step is used to collect information around observables and anomalies via the data sources identified in the previous step. AOOs should leverage various business organizations and areas of the OT environment for information for identifying and analyzing anomalies related to the Point & Tag Identification technique. This will allow them to more quickly identify triggering events using the Point & Tag Identification technique, enabling the decision making in the Decision step.

AOOs use the Decision step to determine a course of action based on an event that has occurred. With on the information gathered, the AOO will be able to determine whether anomalous point & tag identification is indicative of an adversary’s presence in the network (thus initiating incident response procedures) or if there is no evidence of malicious activity associated with anomalous point & tag identification (thus initiating corrective maintenance procedures).
Additional assistance regarding general sensor placement and capability development is available through DOE. AOOs can refer to the CyOTE methodology for more information on CyOTE’s approach to identifying anomalies in an OT environment, which, when perceived, initiates investigation and analysis to comprehend the anomaly.
# APPENDIX A: DATASETS TO SUPPORT TRIGGERING EVENT ANALYSIS FOR T861: POINT & TAG IDENTIFICATION

## Table 5: Datasets to Assist with Analyzing Triggering Events

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Example Tools</th>
<th>Who Can Assist</th>
<th>Relevance</th>
</tr>
</thead>
</table>
| NetFlow and Packet Data      | ● Wireshark/Tshark  
● Commercial Passive Network Monitoring Tools (Claroty, Dragos, Nozomi, SilentDefense)  
● Zeek  
● NetworkMiner  
● Snort  
● Suricata  
● Security Onion  | ● Network Security Team  
● IT or OT System Admins  | NetFlow and packet data assists with identification of hosts sending point & tag identification requests. |
| Device and System Logs       | ● SysInternals SysMon  
● SysInternals PsLogList  
● EvtxToElk  
● Python-evtx  
● OSQuery  | ● Network Security Team  
● IT or OT System Admins  | Device and system logs often show the applications responsible with communications. An application that sends or receives point & tag identification requests might have corresponding log entries depending on the scope of the communication. |

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