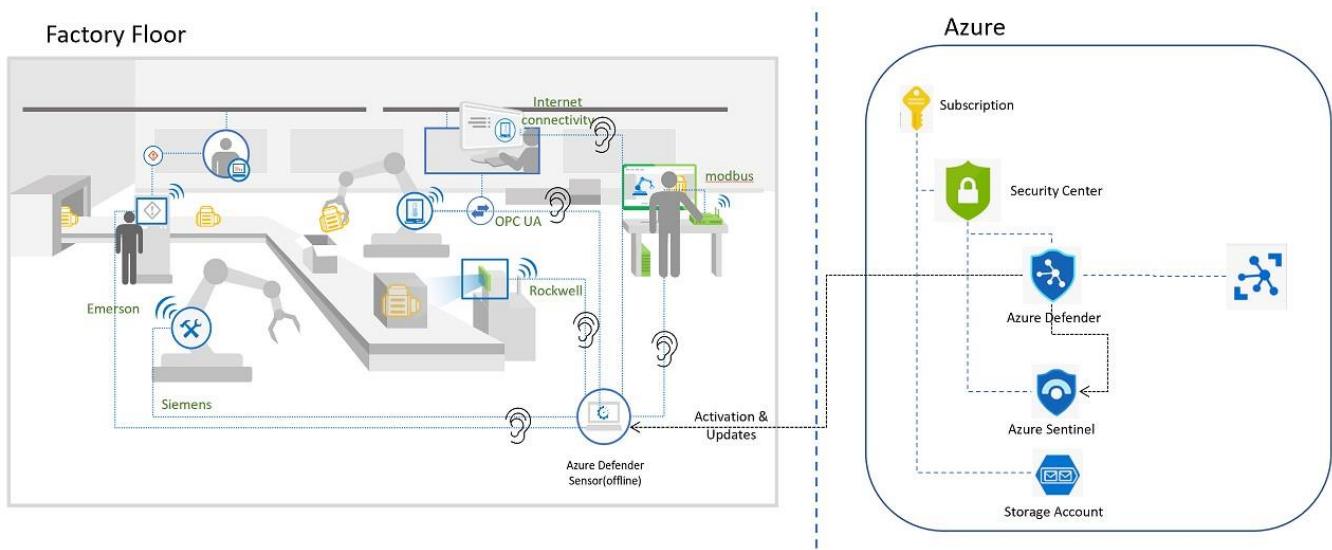


# Internet of Things - Microsoft Defender for IoT HOL

!! Since the PDF contains hyperlinks, please download the file before proceeding!!

## Architecture Diagram

During this workshop we will be focusing on simulating traffic by playing some Packet captures, visualizing and analyzing the data on the sensor console. We will also integrate our sensor with Microsoft Sentinel, to explore alert handling, and for writing queries to help with alert investigation. This Hands-on-Lab (HOL) will focus on securing your facilities. The scenario below is one of many you would apply these lessons to, other scenarios are Oil, Gas, Utility, and Energy companies.



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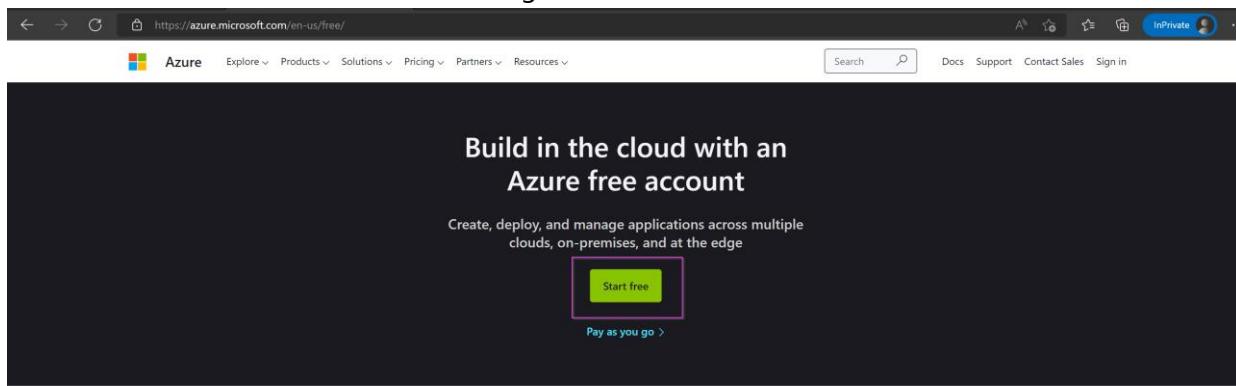
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## Exercise #1: Enabling Defender

### Task 1: Create an Azure Subscription

1. Use this link to set up your free trial: <https://azure.microsoft.com/en-us/free/>.
2. Click on “**Start Free**” as shown in the image



3. Follow the prompts to **Create your Account** and **Sign in**.
4. On the Azure Portal, go to type “**Subscriptions**” on the search bar on top.

The screenshot shows the Microsoft Azure portal homepage. The left sidebar has 'Azure services' and 'Resource' sections. The main area shows a list of subscriptions under 'Services'. One subscription, 'Visual Studio Enterprise Subscription', is highlighted with a pink box. Other listed subscriptions include 'Event Hubs Clusters', 'Notification Hubs', 'Device Update for IoT Hubs', and 'Azure Synapse Analytics (private link hubs)'. Below the subscriptions, there's a 'Marketplace' section with items like 'Autonomous Anomaly Detection' and 'Managed Azure Subscription'. At the bottom, there are navigation links for 'Subscriptions', 'Resource groups', 'All resources', and 'Dashboard'.

5. Your subscription will show up on the list of “**Subscriptions**”.

The screenshot shows the 'Subscriptions' page in the Azure portal. The top navigation bar includes 'Home > Subscriptions'. The main content area shows a table of subscriptions. The first row, 'Visual Studio Enterprise Subscription', is highlighted with a red box. The table columns include 'Subscription name', 'Subscription ID', 'My role', 'Current cost', 'Secure Score', 'Parent management group', and 'Status'. The status for this subscription is 'Active'.

Subscription name	Subscription ID	My role	Current cost	Secure Score	Parent management group	Status
Visual Studio Enterprise Subscription	2131d18-92b6-4c00-b327-937eb90512a	Account admin	C\$11.29	41%		Active

## Task 2: Enabling Microsoft Defender for IoT on the Subscription

1. In the [Azure Portal](#), search for **Microsoft Defender for IoT**. Select **Microsoft Defender for IoT** in the popup window, to open the Microsoft Defender for IoT Page.

Microsoft Defender for IoT

All Services (27) Documentation (99+) Azure Active Directory (1) Resources (0) Resource Groups (0)

Marketplace (0)

Services

Microsoft Defender for IoT

IoT Hub  
Microsoft Sentinel  
Form recognizers  
Power Platform

Recent resources

Name

mdfilesmst01  
rg-md4iot-mst01  
vm-md4iot-host  
AIA-Personal-MST01  
firmwaremst  
iot-s1-mst02  
rg-iothubs  
rg-storage  
rg-vms  
rg-eflow-sample-mst01  
rg-cog-services

Documentation

Microsoft Defender for IoT documentation | Microsoft Docs  
Defender for IoT installation - Azure Defender for IoT ...  
Integrate Microsoft Sentinel and Microsoft Defender for IoT ...  
Manage your IoT devices with the ... - docs.microsoft.com

Azure Active Directory

Microsoft Defender for IoT Micro agent Public Preview  
microsoft-defender-for-iot@service.microsoft.com

Group

Searching 1 of 34 subscriptions. Change

Give feedback

Resource group

3 weeks ago

Resource group

3 weeks ago

Resource group

3 weeks ago

[https://ms.portal.azure.com/#blade/Microsoft\\_Azure\\_Security/SecurityMenuBlade/Overview](https://ms.portal.azure.com/#blade/Microsoft_Azure_Security/SecurityMenuBlade/Overview)

2. On the Defender for IoT page, in the **Getting Started** section, select **Pricing**.

Home > Defender for IoT

Defender for IoT | Pricing

Showing subscription 'Visual Studio Enterprise Subscription'

Search (Ctrl+ /) Refresh Add plan Download on-premises management console activation file

Partial data is shown because you have limited permissions to some of your subscriptions. Make sure you have Security Reader permissions on the relevant subscriptions to view related data.

General

Getting started  
Device inventory (Preview)  
Alerts (Preview)  
Workbooks (Preview)

Management

Sites and sensors  
**Pricing** (highlighted with a red box)  
Settings (Preview)

No subscriptions onboarded

Define committed device coverage or work with the trial.

Onboard subscription

For more information on Microsoft Defender for IoT pricing, visit the [Pricing page](#).

3. On the **Pricing** page, select **+Add Plan**.

Home > Defender for IoT

Defender for IoT | Pricing

Showing subscription 'Visual Studio Enterprise Subscription'

Search (Ctrl+ /) Refresh + Add plan Download on-premises management console activation file

Partial data is shown because you have limited permissions to some of your subscriptions. Make sure you have Security Reader permissions on the relevant subscriptions to view related data.

General

Getting started  
Device inventory (Preview)  
Alerts (Preview)  
Workbooks (Preview)

Management

Sites and sensors  
**Pricing** (highlighted with a red box)  
Settings (Preview)

No subscriptions onboarded

Define committed device coverage or work with the trial.

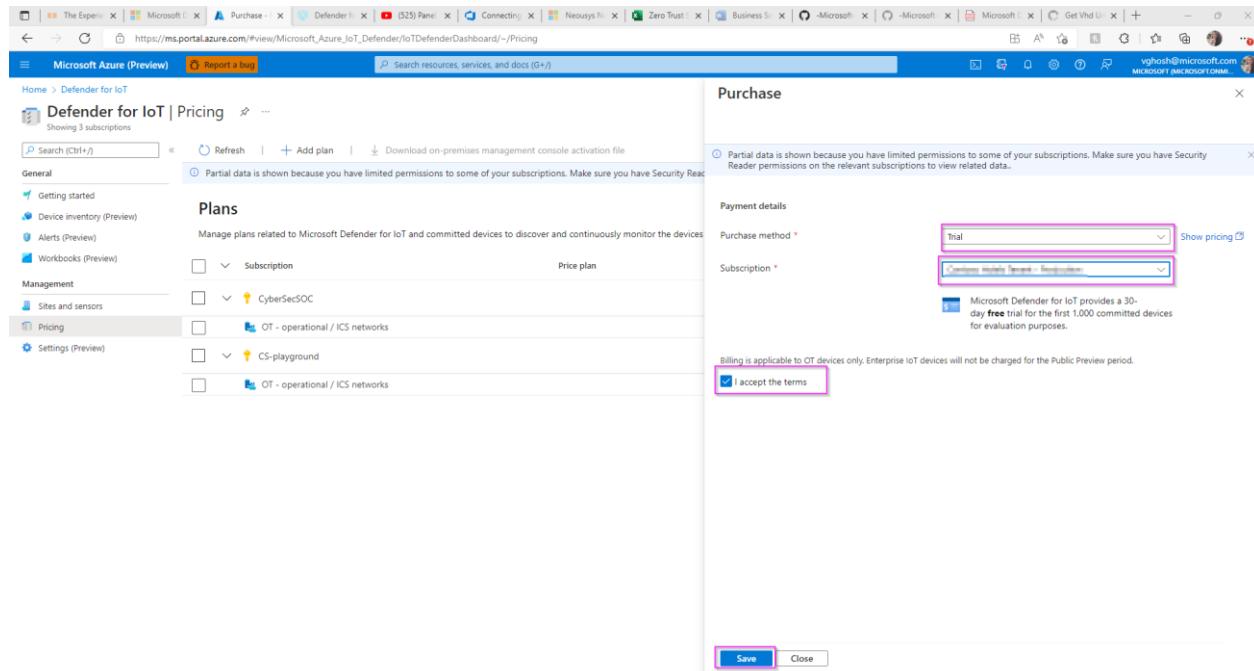
Onboard subscription

For more information on Microsoft Defender for IoT pricing, visit the [Pricing page](#).

4. In the popup screen, select:

- a. **Purchase Method: Trail**

- b. **Subscription:** pick the trial subscription you created
- c. Click “I accept the terms”, followed by “Save”.



You now have a valid Microsoft Defender for IoT Trial with **1000 committed devices**. These devices represent all those equipment/sensors connected to your network in the facility you are analyzing. This configuration allows you a **30-day trial for free**.

## Exercise #2: Deploy the Sensor in Azure

Task 1: Create a Resource group to automatically deploy your sensor, storage account and network security group to

For the deployment, a **VHD file is used**. The link for the IoT sensor installation is in the email you have received.

**Please note - This link is private and will expire in 5 days.**

1. Click the link below to generate a template deployment installation

<https://ms.portal.azure.com/#create/Microsoft.Template/uri/https%3A%2F%2Fraw.githubusercontent.com%2FAzure%2F-Microsoft-Defender-for-IoT%2Fmain%2FHands%2520on%2520Lab%2520Documents%2FAzureDeploy.json>

2. You will be taken to a custom deployment page that looks like the image below:

**Project details**

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription \* ① BuildEnv

Resource group \* ② Create new

**Instance details**

Region \* ③ East US

Location ④ [resourceGroup().location]

Deploy Public IP ⑤ true

Put Password To Key Vault ⑥ true

Source VHDURL \* ⑦ [redacted]

Sensor Count ⑧ 1

- 1) Please select your **Subscription** linked to the trail service.
  - 2) Please create a new **Resource Group** (Use the hyperlink below the box). We recommend creating a new one to easily identify the relevant resources of the trail service.
  - 3) Please select the **Region** (Time zone) to which you are deploying the trail service to.
  - 4) Please leave the **Location** box with its default value, no need to change it.
  - 5) **[OPTIONAL]** Set the **Public IP** option to "true". **However, doing this will open your sensor to the internet. If you have alternate ways to publish the sensor to end users, then just use the internal ip by setting "Deploy Public IP" to "false".**
  - 6) Set this field to true if you want to store your secrets in keyvault.
  - 7) Please paste the link of the **VHD** copied from the email into the **Source VHDURL** field.
3. Once complete please click on the **Review + Create** button Upon validation completion, proceed to click on the **Create** button to initiate the process. The process runs for approx. 30 to 60 minutes.

Validation Passed

Basics Review + create

Summary

Customized template 3 resources

Terms

Azure Marketplace Terms | Azure Marketplace

By clicking "Create," I (a) agree to the applicable legal terms associated with the offering; (b) authorize Microsoft to charge or bill my current payment method for the fees associated with the offering(s), including applicable taxes, with the same billing frequency as my Azure subscription, until I discontinue use of the offering(s); and (c) agree that, if the deployment involves 3rd party offerings, Microsoft may share my contact information and other details of such deployment with the publisher of that offering.

Microsoft assumes no responsibility for any actions performed by third-party templates and does not provide rights for third-party products or services. See the [Azure Marketplace Terms](#) for additional terms.

**Create** < Previous Next

## Task 2: Access your Virtual Machine.

### Option #1: If you deployed with Keyvault

- Once the deployment is complete, click on "Go to resource group" as shown in the image below.

Microsoft.Template-20220713114358 | Overview

Your deployment is complete

Deployment name: Microsoft.Template-20220713114358  
Subscription: BellSoft  
Resource group: KeyVaultTest

Start time: 7/13/2022, 11:44:03 AM  
Correlation ID: a0f68669-4efc-42b8-b168-5d8887ada934

Deployment details (Download)

Resource	Type	Status	Operation details
Reset-password0	Microsoft.Resources/deployments	OK	<a href="#">Operation details</a>
Post-Deploy0	Microsoft.Resources/deployments	OK	<a href="#">Operation details</a>
VMDeployment	Microsoft.Resources/deployments	OK	<a href="#">Operation details</a>
copyhd	Microsoft.Resources/deployments	OK	<a href="#">Operation details</a>

Next steps

[Go to resource group](#)

- Go to the keyvault resource from the list.

KeyVaultTest | Overview

Subscription (move) : BuildEnv  
Subscription ID : 161ccbf470b3-4fa3-a1fb-548c-e4bd70a6  
Tags (edit) : createdate: 07/13/2022 owner: vghosh

Resources Recommendations

Name	Type	Location
customxx24k5pt7ngp2	Storage account	West US
SOC-KVuq63gjmwvo2do-Play	Key vault	West US
SOC-NSGxx4k5pt7ngp2-Play	Network security group	West US
SOC-vms24k5pt7ngp2-Play-Image	Managed identity	West US
SOC-vms24k5pt7ngp2-Play-pip0	Image	West US
SOC-vmx24k5pt7ngp2-Play-pip0	Regular Network Interface	West US
SOC-vmx24k5pt7ngp2-Play-pip0	Public IP address	West US
SOC-vms24k5pt7ngp2-Play-vm	Virtual machine	West US
SOC-vms24k5pt7ngp2-Play-disk1	Disk	West US
SOC-vms24k5pt7ngp2-Play	Virtual network	West US

- Select the application and click on "Access Policies" -> "+Create".

SOC-KVuq63gjmwvo2do-Play | Access policies

+ Create

Access policies enable you to have fine grained control over access to vault items. Learn more

Showing 1 to 1 of 1 records.

Name	Email	Key Permissions
SOC-vmsidentityuq63gjmwvo2do-Play		

4. Under "Permissions" select "Key & Secret Management" template.

Home > Resource groups > KeyVaultTest > SOC-KVuq63gjmwo2do-Play | Access policies >

Create an access policy ...

SOC-KVuq63gjmwo2do-Play

**① Permissions**   **② Principal**   **③ Application (optional)**   **④ Review + create**

Configure from a template  
Key & Secret Management

Key permissions	Secret permissions	Certificate permissions
Key Management Operations	Secret Management Operations	Certificate Management Operations
<input checked="" type="checkbox"/> Select all	<input checked="" type="checkbox"/> Select all	<input type="checkbox"/> Select all
<input checked="" type="checkbox"/> Get	<input checked="" type="checkbox"/> Get	<input type="checkbox"/> Get
<input checked="" type="checkbox"/> List	<input checked="" type="checkbox"/> List	<input type="checkbox"/> List
<input checked="" type="checkbox"/> Update	<input checked="" type="checkbox"/> Set	<input type="checkbox"/> Update
<input checked="" type="checkbox"/> Create	<input checked="" type="checkbox"/> Delete	<input type="checkbox"/> Create
<input checked="" type="checkbox"/> Import	<input checked="" type="checkbox"/> Recover	<input type="checkbox"/> Import
<input checked="" type="checkbox"/> Delete	<input checked="" type="checkbox"/> Backup	<input type="checkbox"/> Delete
<input checked="" type="checkbox"/> Recover	<input checked="" type="checkbox"/> Restore	<input type="checkbox"/> Recover
<input checked="" type="checkbox"/> Backup		<input type="checkbox"/> Backup
<input checked="" type="checkbox"/> Restore		<input type="checkbox"/> Restore
Cryptographic Operations	Privileged Secret Operations	Privileged Certificate Operations
<input type="checkbox"/> Select all	<input type="checkbox"/> Select all	<input type="checkbox"/> Select all
<input type="checkbox"/> Decrypt	<input type="checkbox"/> Purge	
<input type="checkbox"/> Encrypt		
<input type="checkbox"/> Unwrap Key		
<input type="checkbox"/> Wrap Key		
<input type="checkbox"/> Verify		
<input type="checkbox"/> Sign		

Previous   **Next**

5. Under "Principle" select a principle

Home > Resource groups > KeyVaultTest > SOC-KVuq63gjmwo2do-Play | Access policies >

Create an access policy ...

SOC-KVuq63gjmwo2do-Play

**① Permissions**   **② Principal**   **③ Application (optional)**   **④ Review + create**

Only 1 principal can be assigned per access policy.  
Use the new embedded experience to select a principal. The previous popup experience can be accessed here. [Select a principal](#)

Search by object ID, name, or email address

- [John Doe](#) [Edit principal](#)
- [Jane Doe](#) [Edit principal](#)
- [Alice Smith](#) [Edit principal](#)
- [Bob Smith](#) [Edit principal](#)
- [Charlie Brown](#) [Edit principal](#)
- [Diana Prince](#) [Edit principal](#)

**Selected item**  
No item selected

6. You can skip over "Application".

Home > Resource groups > KeyVaultTest > SOC-KVuq63gjmwvo2do-Play | Access policies >

### Create an access policy ...

SOC-KVuq63gjmwvo2do-Play

Permissions     Principal     Application (optional)   

Authorizes this application to perform the specified permissions on the User's or Group's behalf.  
Use the new embedded experience to select an application. The previous popup experience can be accessed here. [Select an application](#)

Search by object ID, name, or email address

 5d62bf487ee14fb8884e0582f29be8e1-977f-4fa3-bf83-957308750ffb
 AcmeDnsValidator-ting0113im0 604fb01b-9fe8-4926-b954-b922680cbf40
 aksdemoSP-20200512091755 b59a0f98-632d-403b-987c-c68a88ccf81c0
 amasf 7056827c-0953-418c-9426-f6890b29e79
 ami-94dec3a3-89b7-402c-a6a6-3db32f3b2d40 b179cab-f3fc-4162-a465-eca5e6f54087
 ami-9f876ca0-654b-468b-8d6b-abf6aa26fce9 90534bd9-e88b-46f0-adf8-c7cef00a9954

#### Selected item

No item selected

Previous

Next

## 7. Click on "Create".

Home > Resource groups > KeyVaultTest > SOC-KVuq63gjmwvo2do-Play | Access policies >

### Create an access policy ...

SOC-KVuq63gjmwvo2do-Play

Permissions     Principal     Application (optional)

Review + create

#### Key Permissions

Key Management Operations	All selected
Cryptographic Operations	None selected
Privileged Key Operations	None selected
Rotation Policy Operations	All selected

#### Secret Permissions

Secret Management Operations	All selected
Privileged Secret Operations	None selected

#### Certificate Permissions

Certificate Management Operations	None selected
Privileged Certificate Operations	None selected

#### Principal

Principal name	Vishakha Ghosh
Object ID	4d53f3b7-e555-4354-a330-193b4cd1ef28

#### Application

Authorized application	None selected
Object ID	None selected

Previous

Create

## 8. Go back to your resource group and select the Virtual Machine resource.

Subscription (move) : BuildEnv  
Subscription ID : 1c61ccbf-7031-45a3-a1fb-54fc4e46d70a6  
Tags (edit) : createdate : 07/13/2022 owner : vghosh

Deployments : 2 Failed 10 Succeeded  
Location : West US

## 9. Make a note of the Public IP address.

Resource group (move) :  
Status : Running  
Location : East US  
Subscription (move) :  
Subscription ID :  
Tags (edit) : azsecpack : nonprod

Operating system : Linux (ubuntu 18.04)  
Size : Standard D4s v3 (4 vcpus, 16 GiB memory)  
Public IP address : 20.124.23.178  
Virtual network/subnet : SOC-Play/default  
DNS name : Not configured

Properties Monitoring Capabilities (7) Recommendations Tutorials

Virtual machine		Networking	
Computer name	Sensor	Public IP address	20.124.23.178
Health state	-	Public IP address (IPv6)	-
Operating system	Linux (ubuntu 18.04)	Private IP address	10.10.10.1
Publisher	-	Private IP address (IPv6)	-
Offer	-	Virtual network/subnet	SOC-Play/default
Plan	-	DNS name	Configure

## Option #2: If you deployed without Keyvault.

### 1. Once the deployment is complete, go to "Reset-password0" by clicking the button.

Deployment name: Microsoft.Template-20220630145822  
Subscription: BuildEnv  
Resource group: Vghosh\_IoTSensor

Start time: 6/30/2022, 2:58:25 PM  
Correlation ID: ac55ba5c-e35a-4a36-b3ee-37b01fcdb3f

Deployment details (Download)

Resource	Type	Status	Operation details
Reset-password0	Microsoft.Resources/deployments	OK	Operation details
Post-Deploy0	Microsoft.Resources/deployments	OK	Operation details
VMdeployment	Microsoft.Resources/deployments	OK	Operation details
copyvhd	Microsoft.Resources/deployments	OK	Operation details

Next steps

Go to resource group

2. Copy the system generated random password from the "Password" field and make a note of the VMName.

Home > Microsoft.Template-20220630145822 > Reset-password0

**Reset-password0 | Outputs**

Deployment

Search (Ctrl+ /) vmObject

Outputs (Copied)

Overview Inputs Outputs Template

{"VMName": "SOC-vmw7ne3eaow5oxw0-Play", "Password": "KChR9dMLp3VFkar2Yp8I99PM2V8="}

3. Click "go to resource group" from the previous screen.

Home >

**Microsoft.Template-20220630145822 | Overview**

Deployment

Search (Ctrl+ /) Delete Cancel Redeploy Refresh

We'd love your feedback! →

Your deployment is complete

Deployment name: Microsoft.Template-20220630145822  
Subscription: BuildEnv  
Resource group: Vghosh\_IoTSensor

Start time: 6/30/2022, 2:58:25 PM  
Correlation ID: ac55ba5c-e35a-4a36-b3ee-37b01fcdb3f

Deployment details (Download)

Resource	Type	Status	Operation details
Reset-password0	Microsoft.Resources/deployments	OK	Operation details
Post-Deploy0	Microsoft.Resources/deployments	OK	Operation details
VMdeployment	Microsoft.Resources/deployments	OK	Operation details
copyvhd	Microsoft.Resources/deployments	OK	Operation details

Next steps

Go to resource group (Copied)

4. Select the virtual machine from the list of resources in the group.

Microsoft Azure (Preview) Search resources, services, and docs (G+)

Home > Microsoft.Template 20220503175515

**XXX resource group**

Search (Ctrl+ /) Create Manage view Delete resource group Refresh Export to CSV Open query Assign tags Move Delete ...

View Cost JSON View

Overview

Subscription (move) : Deployments : 13 Succeeded

Subscription ID : Location : East US

Tags (edit) : Click here to add tags

Resources Recommendations

Filter for any field... Type == all × Location == all × Add filter

Showing 1 to 9 of 9 records. Show hidden types

Name	Type	Location
copyvhd	Deployment Script	East US
customfici6u5atkwu	Storage account	East US
SOC NSGfici6u5atkwu-Play	Network security group	East US
<b>SOC-vmfici6u5atkwu-Play</b>	Virtual machine	East US

5. Make a note of the Public IP address.

**SOC** Virtual machine

**Essentials**

- Resource group: (move)
- Status: Running
- Location: East US
- Subscription: (move)
- Subscription ID:
- Tags: (edit) azsecpack : nonprod

**Properties** Monitoring Capabilities (7) Recommendations Tutorials

**Virtual machine**

Computer name	Sensor
Health state	-
Operating system	Linux (ubuntu 18.04)
Publisher	-
Offer	-
Plan	-

**Networking**

Public IP address	20.124.23.178
Public IP address (IPv6)	-
Private IP address	10.10.10.4
Private IP address (IPv6)	-
Virtual network/subnet	SOC
DNS name	Not configured

### Task 3: Access your sensor via the console

1. Proceed to access the console by using the selected networking method IP (Public or IP) using <https://> as shown in the image and sign in with the IP you copied in the previous step. Username is **cyberx\_host** and the password is what you copied in step 2.

Microsoft | Defender for IoT sensor

**Sensor Sign in**

User name

Password

Forgot password? (for admin users only)  
[Reset](#)

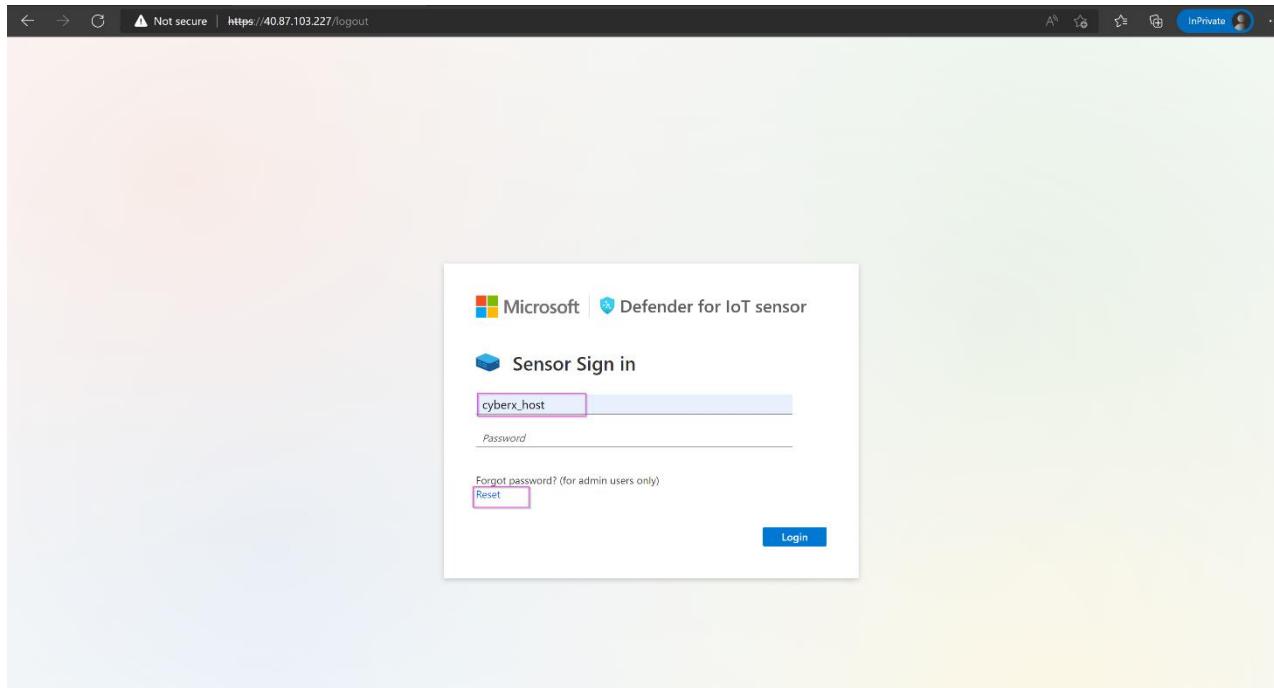
**Login**

2. Upon successful login please proceed immediately to change the password by clicking on the username on the top right corner and selecting **Sign out**.

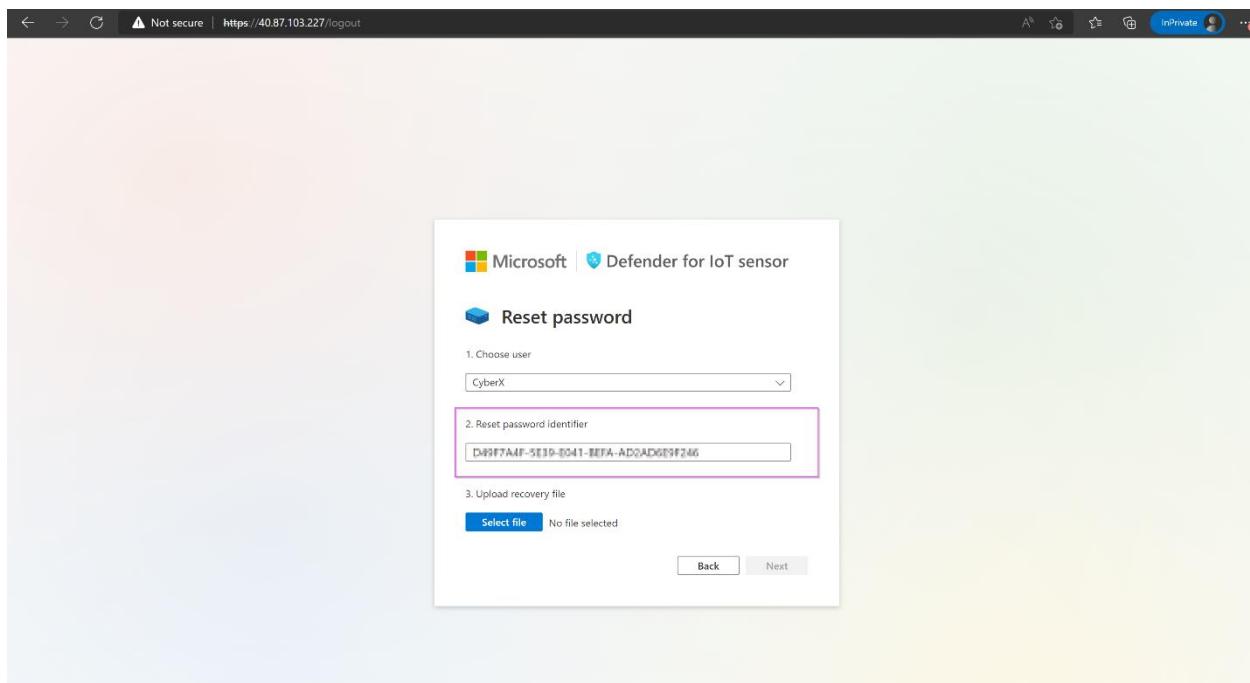
- After signing out, please return to the Azure portal and navigate to “**Defender for IoT**”. Select “**Sites and sensors**”, select your sensor from the list, and click on “**Recover my password**”.

- You will see this prompt asking for the “secret identifier”.

- Return to the sensor console and type in the username followed by “Reset” as shown.



6. Copy the identifier.



7. Paste in the box on the Defender for IoT Azure window. Click "**Recover**".

The screenshot shows the Microsoft Defender for IoT interface. On the left, there's a navigation sidebar with 'General' and 'Management' sections. Under 'Management', 'Sites and sensors' is selected. In the main area, it says 'Showing 2 of 2 sensors'. There are two sensors listed: 'D4IOT-CxE-Site - D4IOT-CxE-Site' (EIoT) and 'D4IOTsensor-TT' (OT). A modal window titled 'Recover' is open, featuring a lock icon and a key icon. It contains a text input field with the value 'D49F7A4F-5E39-E041-BEFA-AD2AD6E9F246'. Below the input field are 'Recover' and 'Cancel' buttons.

8. The “*password\_recovery*” file download starts. Once the download is complete, return to the sensor console and click on “**Upload recovery file**”. **Do not unzip the folder**.

The screenshot shows the 'Reset password' wizard. Step 1: Choose user dropdown is set to 'CyberX'. Step 2: Reset password identifier input field contains 'D49F7A4F-5E39-E041-BEFA-AD2AD6E9F246'. Step 3: Upload recovery file section has a 'Select file' button and a message 'No file selected'. At the bottom are 'Back' and 'Next' buttons.

9. Click on “**Next**”.

Microsoft | Defender for IoT sensor

## Reset password

1. Choose user

CyberX\_host

2. Reset password identifier

D9F7A4F-5E19-0411-BFA-AD2AD619F246

3. Upload recovery file

Select file password\_recovery (1).zip

Back Next

10. After uploading the file, you will be shown a temporary password on the screen. Please note it down.

Microsoft | Defender for IoT sensor

## Reset password

User name

CyberX\_host

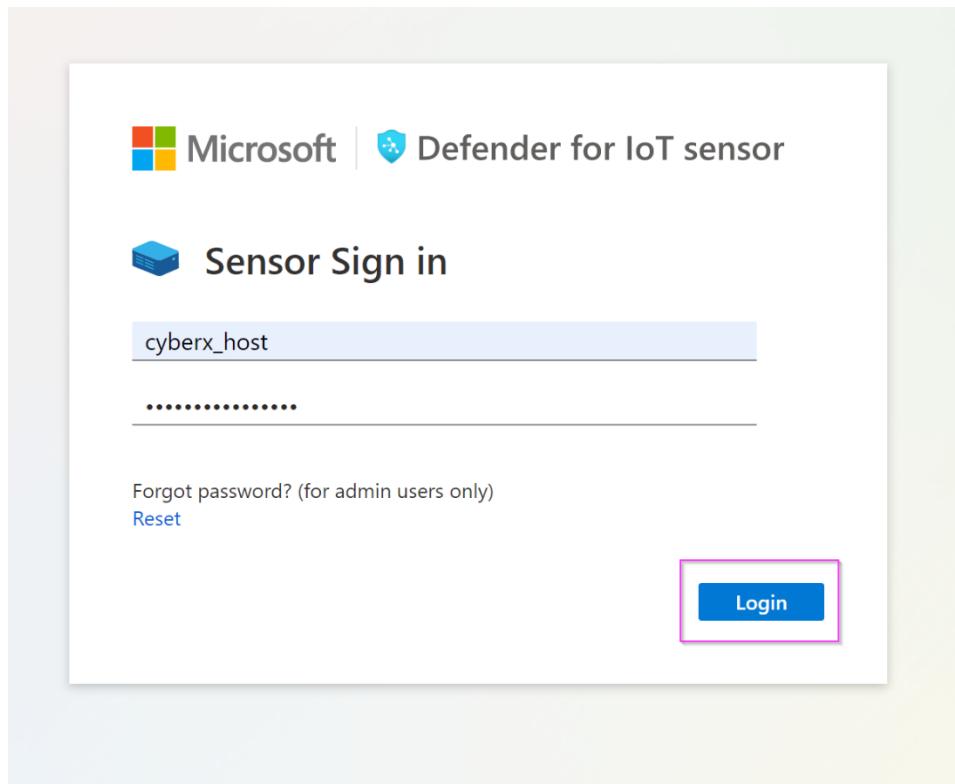
Password

j^\*hn@WTU\*7IP\_3H

Please write your password, it will not be shown again

Next

11. Log in with the new password.



12. Repeat this step for all the usernames.

## Exercise #3: Simulate Data in your sensor

### Task 1: Enabling the PCAP Player

1. The PCAP player needs to be enabled to be visibly available for use in the UI. To do so, please select the "**System settings**" option from the scrolled down left side menu.

The screenshot shows the Microsoft Defender for IoT web interface. The top navigation bar includes the Microsoft logo, the title "Microsoft Defender for IoT - 22.1.3", and a user profile icon. The left sidebar has a collapsed "Alerts" section and a expanded "System settings" section, which is highlighted with a red box. Other options in the sidebar include "Analyze" (with sub-options: Event timeline, Data mining, Risk assessment, Trends & statistics, Attack vector), "Manage" (with sub-options: System settings, Custom alert rules, Users, Forwarding), and "Forwarding". The main content area features four cards under the heading "Sensor Setup": "Sensor Network Settings" (Define sensor network settings), "Connection to Management Console" (Connect this sensor to the on-premises management console), "Time & Region" (Define time zone settings for this sensor), and "Subnets" (Define which networks should be monitored by this sensor). The top right corner of the interface shows icons for gear, cloud, and a user profile, along with the text "cyberx\_host".

2. Scroll down to locate the "**Advanced Configuration**" option (Shown in the image below in the red square).

The screenshot shows the Microsoft Defender for IoT interface. On the left, there's a navigation sidebar with sections like Alerts, Analyze, and Manage. Under Manage, 'System settings' is selected. The main area is titled 'Health and troubleshooting' and contains four cards: 'Backup & Restore', 'System Health Check', 'SNMP MIB Monitoring', and 'Advanced Configurations'. The 'Advanced Configurations' card is highlighted with a red box.

3. From "Select a Configuration Category", select Pcaps.

The screenshot shows a 'Advanced configurations' dialog box. On the left is a sidebar with various configuration categories: Import, Internet Addresses, Management, MySQL, Pcaps (which is selected and highlighted with a red box), Phrases, Ports, Profiling, Programming Diff, Purdue Layers, Query Parse Config, Redis, Remote Interfaces, Remote Upgrade, Reset System Data, and Rule Engine. On the right, there's a search bar labeled 'Select a configuration category' and a 'Close' button at the bottom.

4. Scroll down to locate the "**enabled**" variable and set it to **1**. Click **Save** and approve to commit the change.

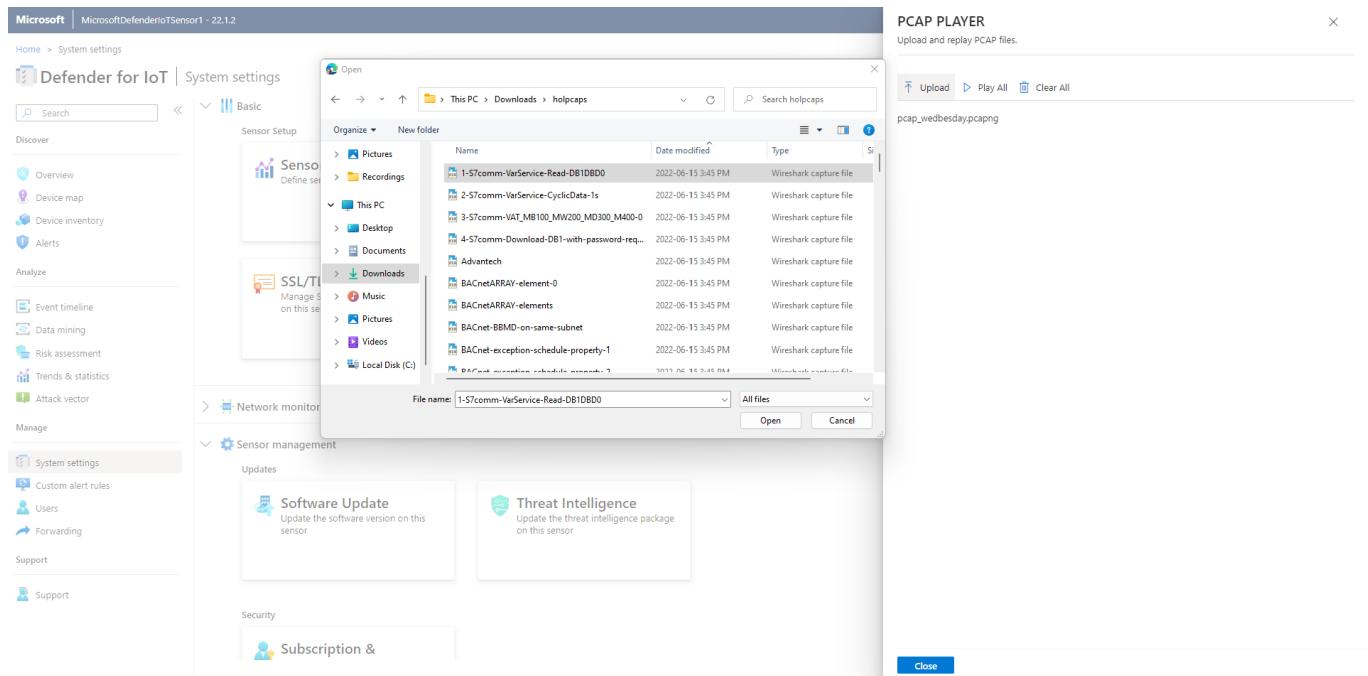
The screenshot shows the Microsoft Defender for IoT interface. On the left, there's a sidebar with options like 'Analyze', 'Event timeline', 'Data mining', 'Risk assessment', 'Trends & statistics', and 'Attack vector'. Under 'Manage', 'System settings' is selected. In the main area, there are sections for 'Backup data and restore the latest backup' and 'SNMP MIB Monitoring'. A modal window titled 'Advanced configurations' is open, showing configuration parameters such as 'cache.should.save.pcap=1', 'archive.cache.dir=', '# 7 GB', 'filtered.cache.dir.size.megabytes.max=7168', 'filtered.cache.dir.size.megabytes.min=3072', 'player.max\_size=1000', 'player.max\_amount=20', 'player.params=enabled\_0', and 'virtual.lan.hierarchy.depth.support=1'. The 'Save' button at the bottom of this window is highlighted with a red box.

## Task 2: Play PCAP files

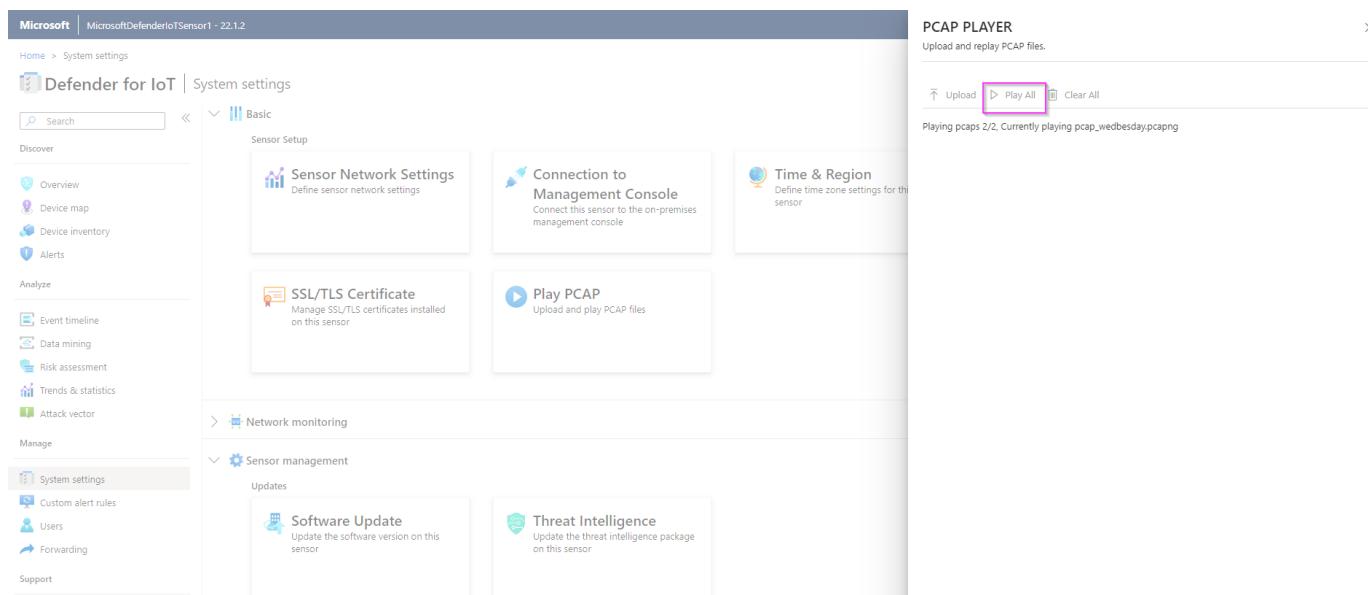
1. Use [this](#) link to download the holcaps.zip folder.
2. Unzip the folder.
3. Scroll all the way down to the bottom to locate if the PCAP Player is enabled (Shown in the image below in the red top square) or not. If the PCAP player is not shown, proceed to click on the arrow next to the **Sensor Management** button (Shown in the image below in the red lower square).

The screenshot shows the Microsoft Defender for IoT interface. The left sidebar includes 'Analyze', 'Event timeline', 'Data mining', 'Risk assessment', 'Trends & statistics', 'Attack vector', 'Manage' (with 'System settings' selected), and 'Integrations'. Below these, 'Forwarding' is listed. In the main content area, there are sections for 'SSL/TLS Certificate' and 'Play PCAP' (which is highlighted with a red box). The 'Play PCAP' section contains the text 'Upload and play PCAP files'. At the bottom of the page, the 'Sensor management' button is also highlighted with a red box in the navigation menu.

4. Click on “Upload” and select your Pcap files from the unzipped folder.



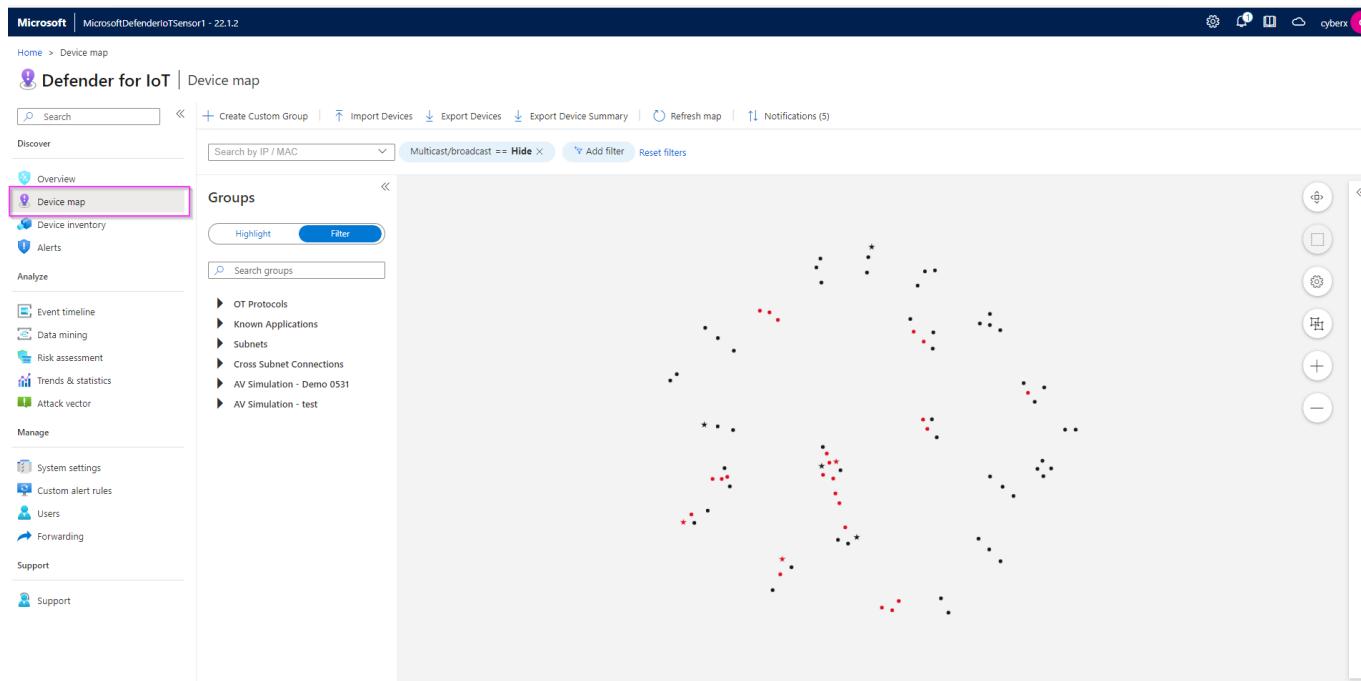
## 5. Click "Play All" to play the Pcaps.



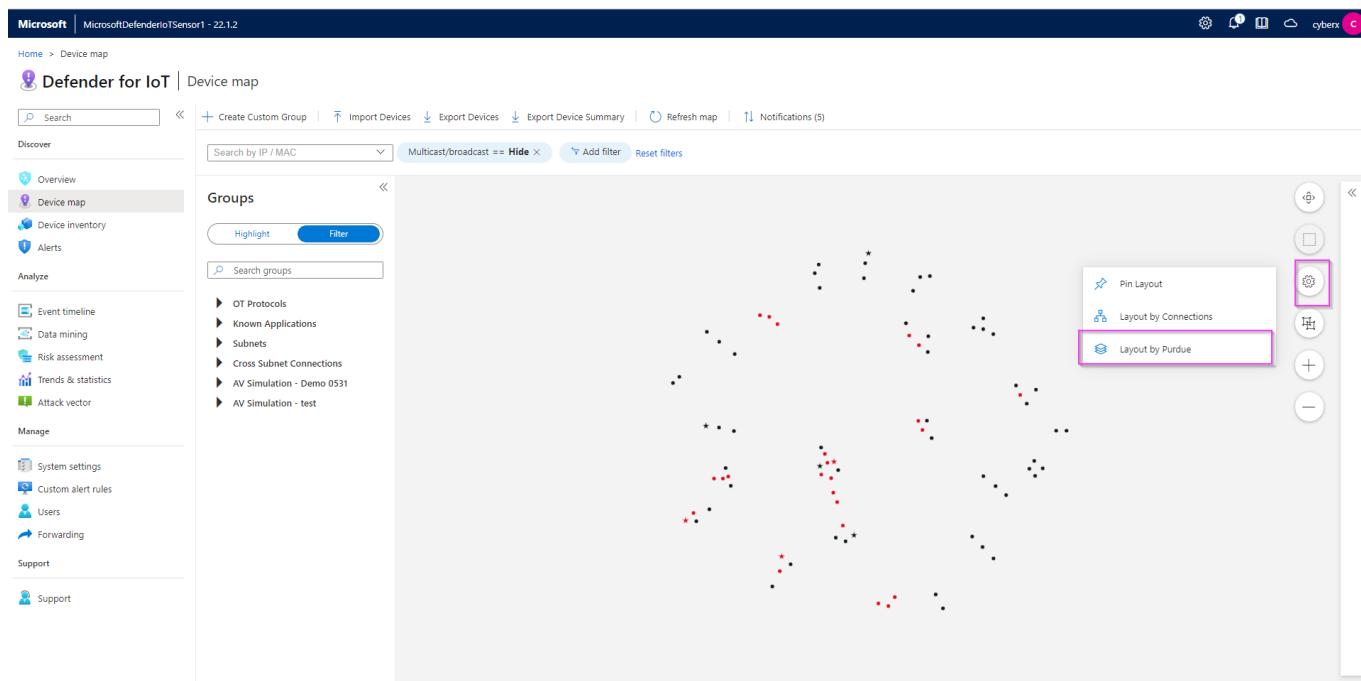
## Exercise 4: Analyzing the Data

### Task 1: Visualize on the Device Map

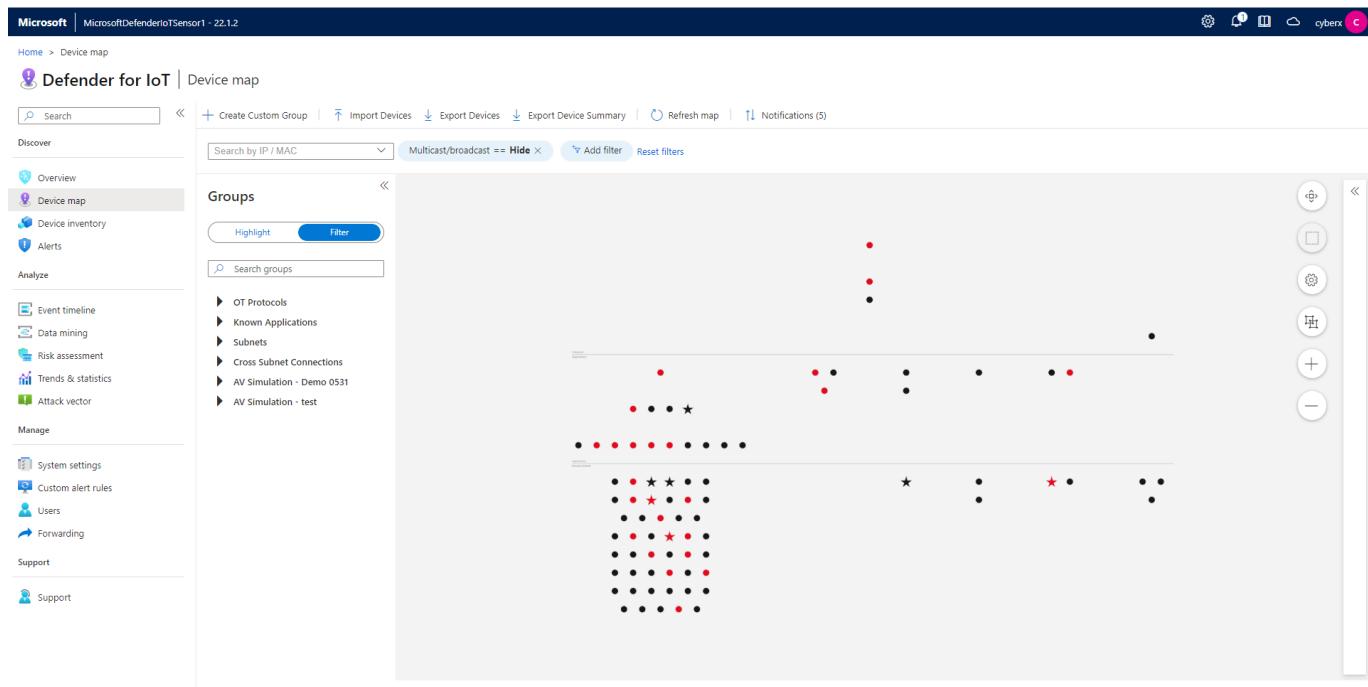
1. Click on “Device Map” from the menu on the left side.



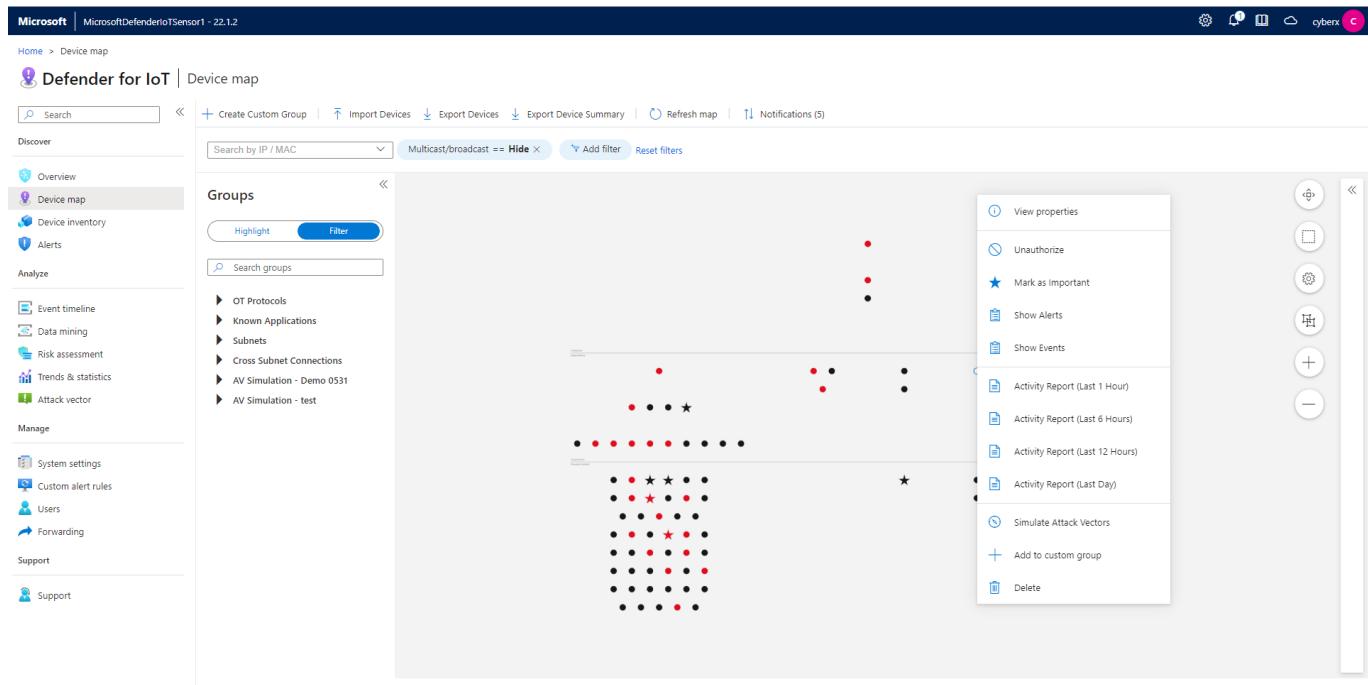
2. Click on the "Settings" option and select **Layout by Purdue** which will allow you to see the different layers between Corporate IT and site operations.



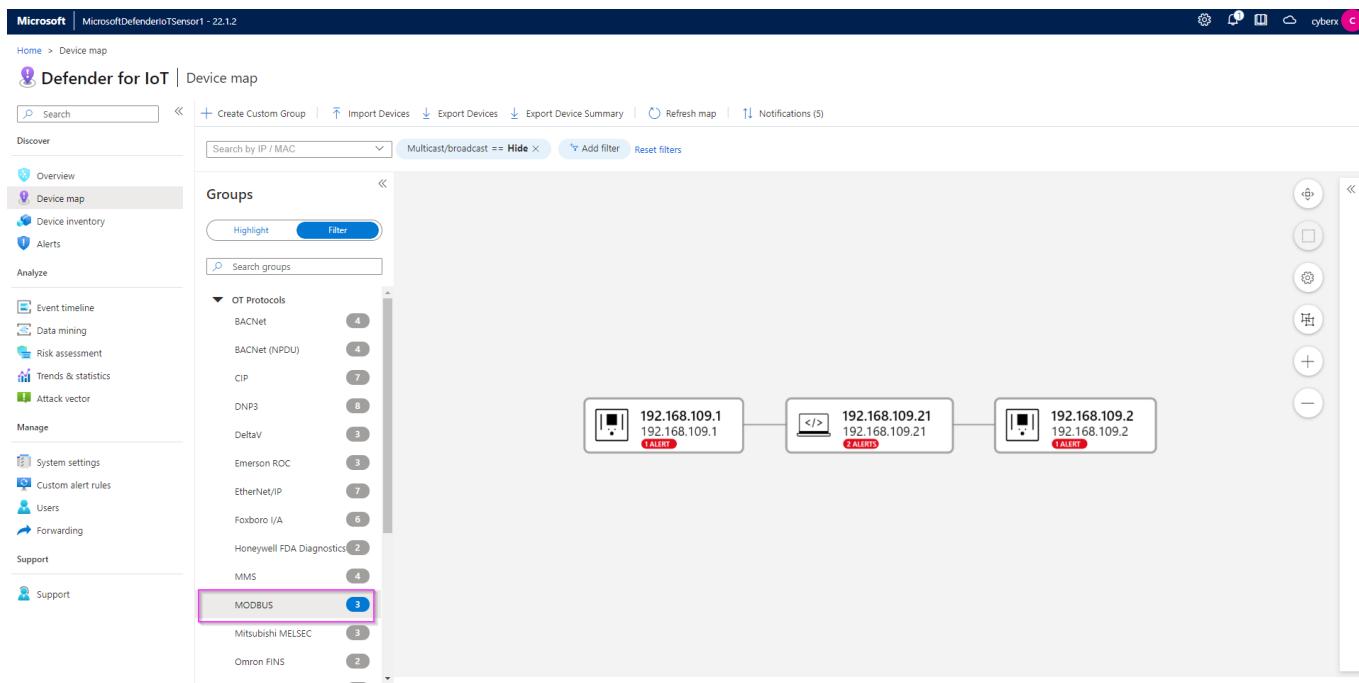
3. Once you confirm the changes, you will see the devices laid out as shown in the image below.



4. Right click on any device (represented by a dot) to view properties, show related events, alerts, reports or simulate attack vectors.

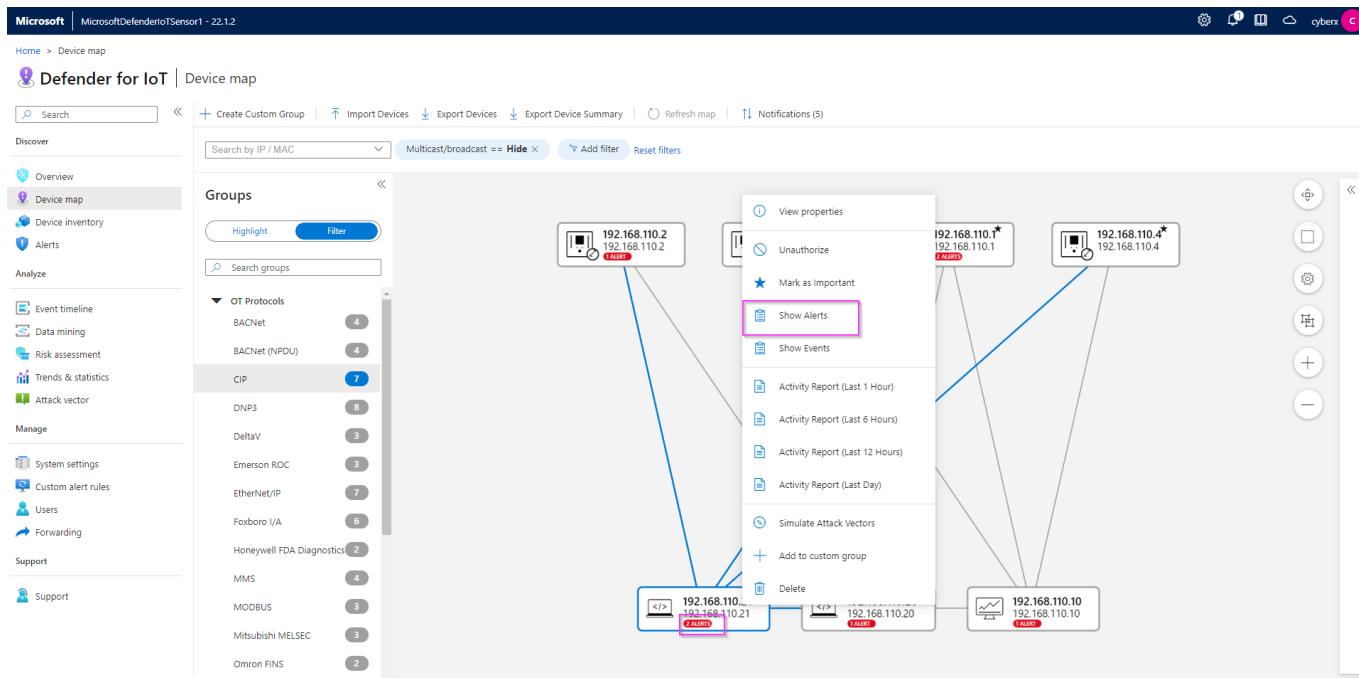


5. To filter by OT Protocols, expand the arrow, and pick the protocol you want to filter by. The console will display the devices that match the filter.



## Task 2: View the associated Alerts

1. Right click on any device that has an Alert associated with it and click on "Show Alerts".



2. The Alerts page helps you identify some important data about the alert, like Alert Severity, Engine, Detection time, as well as the Source Device IPs. It also displays general information about the type of device, network interfaces and protocols.

This screenshot shows the Microsoft Defender for IoT Device map interface. On the left, there's a sidebar with navigation links like Home, Device map, and Alerts. The main area displays a device card for 'Device | 192.168.110.21'. The card includes sections for General Information (Type: Engineering Station, Vendor: INTEL CORPORATE, Location: Automatic), Network Interfaces (IP: 192.168.110.21, MAC: ac:fd:ce:cc:bb:dd), and Protocols (SSH, EtherNet/IP, TDS, FTP, CIP). Below the card is a table of alerts, with one alert highlighted: 'Unauthorized Internet Connectivity Detected' (Critical, Policy Violation, 2 weeks ago, New, Source Device: 192.168.110.21). At the bottom, there's an 'Edit Properties' button.

3.To view more details about the Alert and/or to take remediation actions, select the Alert by checking the box beside it, and picking either “**View Full Details**” or “**Take Action**”.

This screenshot shows the Microsoft Defender for IoT Alerts page. The left sidebar has a 'Discover' section with 'Alerts' selected. The main area shows a table of alerts with two entries: 'Unauthorized Internet Connectivity Detected' (Critical, Policy Violation, 2 weeks ago, New, Source Device: 192.168.110.21) and another identical entry. The first alert is selected, indicated by a checked checkbox. To the right of the table, a detailed view of the selected alert is shown. It includes a summary box with 'Unauthorized Internet Connectivity Detected' (Alert ID: 53, Status: New, Detection time: 2 weeks ago), a description box stating 'A device defined in your internal network is communicating with addresses on the internet. These addresses have not been learned as valid addresses.', and a 'Related Devices' section showing a connection between 'Source device' (192.168.110.21, Engineering Station) and 'Destination device' (Internet (37.142.39.186), Internet). At the bottom, there are 'View full details' and 'Take action' buttons.

4.You can view all the alerts on your sensor by clicking on the **Alerts** option on the menu on the left. Make sure all the filters are removed. You can group the alerts by picking an option from the “**Group by**” dropdown.

Showing 22 of 22 alerts

Severity	Name	Engine	Detection time	Status	Source Device
Critical	Unauthorized Internet Connectivity Detected	Policy Violation	2 weeks ago	New	192.168.110.21
Critical	Unauthorized Internet Connectivity Detected	Policy Violation	2 weeks ago	New	192.168.110.23
Critical	Port Scan Detected	Anomaly	2 weeks ago	Closed	192.168.110.21
Major	EtherNet/IP Encapsulation Protocol Command Failed	Operational	2 months ago	New	192.168.110.2
Critical	Unauthorized PLC Programming	Policy Violation	2 months ago	Closed	192.168.122.1
Critical	No Traffic Detected on Sensor Interface	Operational	2 months ago	New	192.168.100.8
Critical	Unauthorized Internet Connectivity Detected	Policy Violation	2 months ago	New	192.168.110.8
Warning	Traffic Detected on Sensor Interface	Operational	2 months ago	New	192.168.110.1
Major	EtherNet/IP Encapsulation Protocol Command Failed	Operational	3 months ago	Closed	192.168.117.23
Critical	Excessive SMB login attempts	Anomaly	3 months ago	New	192.168.117.23
Major	Event Buffer Overflow in Outstation	Operational	3 months ago	New	192.168.117.23
Warning	Controller Reset	Operational	3 months ago	New	192.168.117.23
Warning	Controller Reset	Operational	3 months ago	New	192.168.117.23
Warning	An S7 Stop PLC Command was Sent	Operational	3 months ago	New	192.168.118.22
Warning	An S7 Stop PLC Command was Sent	Operational	3 months ago	New	192.168.118.11
Major	GE SRTP Command Failure	Operational	3 months ago	New	192.168.109.1
Major	Modbus Exception	Protocol Violation	3 months ago	New	192.168.109.2
Major	Modbus Exception	Protocol Violation	3 months ago	New	192.168.108.2
Major	Honeywell Firmware Version Changed	Policy Violation	3 months ago	New	192.168.108.2

## Task 3: Device Inventory

1. This view allows you to see all the devices connected to your sensor as a list. To filter, click on "Add filter" on the top. For example: the "**Is Authorized**" will show you devices that are either authorized or unauthorized depending on value (True or False) you choose.

Showing 100 of 291 items

IP Address	Name	Last Activity	Type	Protocols	MAC Address	Vendor	Firmware Version	Model	Operating System	Rack	Slot
192.168.100.8	192.168.100.8	50 minutes ago	Unknown	DNS, MDNS, Net...	54:14:f9:74:d8:21	INTEL CORPORA...					
192.168.100.1	192.168.100.1	50 minutes ago	Server	DNS							
192.168.1.11	192.168.1.11	50 minutes ago	PLC	Siemens S7	00:fb5:4dbef9	NETGEAR					
192.168.1.180	192.168.1.180	50 minutes ago	HMI	Siemens S7							
192.168.117.23	192.168.117.23	22 hours ago	PLC	DNP3 (Identifier...)	00:30:a7:08:92:c6	SCHWEITZER EN...					
192.168.117.1	192.168.117.1	22 hours ago	Unknown	DNP3 (Identifier...)	00:23:ea:49:5a:c2	CISCO SYSTEMS ...					
192.168.117.22	192.168.117.22	22 hours ago	PLC	DNP3 (Identifier...)	00:30:a7:08:97:0	SCHWEITZER EN...					
192.168.117.25	192.168.117.25	22 hours ago	PLC	DNP3 (Identifier...)	00:cc:1c:02:09:da	EATON CORPOR...					
192.168.117.7	192.168.117.7	22 hours ago	PLC	Siemens SICAM	00:e0:a8:01:90:be	SAT GMBH & CO.	15.01	CPC65 (6065)			
192.168.117.239	192.168.117.239	22 hours ago	Unknown	Siemens SICAM	00:0c:29:28:28:38	VMWARE INC.					
192.168.117.8	192.168.117.8	22 hours ago	PLC	Siemens SICAM	00:e0:a8:01:90:bb	SAT GMBH & CO.	15.01	CPC65 (6065)			
192.168.107.10	FC50507	22 hours ago	DCS Controller	Yokogawa VNet/IP	00:00:64:9d:5d:10	YOKOGAWA DIG...					
192.168.107.1	192.168.107.1	22 hours ago	Unknown	Yokogawa VNet/IP	00:00:64:9d:73:d4	YOKOGAWA DIG...					
192.168.107.2	192.168.107.2	22 hours ago	Unknown	Yokogawa VNet/IP	00:00:64:9e:84:e5	YOKOGAWA DIG...					
192.168.118.3	192.168.118.3	22 hours ago	PLC	Siemens S7	00:01:e3:11:22:33	SIEMENS AG	3.2.6	6E57 315-6EH14...	0	4	
192.168.118.3	192.168.118.3	22 hours ago	PLC	Siemens S7	00:01:e3:11:22:33	SIEMENS AG	3.2.6	6E57 315-9EH14...	1	2	
192.168.118.3	192.168.118.3	22 hours ago	PLC	Siemens S7	00:01:e3:11:22:33	SIEMENS AG	3.2.6	6E57 315-8EH14...	1	2	

2. You can export the list to a csv file.

Microsoft | MicrosoftDefenderIoTSensor1 - 22.1.2

Home > Device inventory

**Defender for IoT | Device inventory**

Search | Save Filter | Refresh | Edit Columns | Export

Discover

Overview  
Device map  
**Device inventory**  
Alerts  
Analyze

Event timeline  
Data mining  
Risk assessment  
Trends & statistics  
Attack vector  
Manage

System settings  
Custom alert rules  
Users  
Forwarding  
Support

Support

Showing 100 of 291 items

IP Address	Name	Last Activity	Type	Protocols	MAC Address	Vendor	Firmware Version	Model	Operating System	Rack	Slot
192.168.100.8	192.168.100.8	An hour ago	Unknown	DNS, MDNS, Net...	5:14:f3:74:d8:21	INTEL CORPORA...					
192.168.100.1	192.168.100.1	An hour ago	Server	DNS							
192.168.1.11	192.168.1.11	An hour ago	PLC	Siemens S7	0:0:fb:5:4:db:e1:3	NETGEAR					
192.168.1.180	192.168.1.180	An hour ago	HMI	Siemens S7							
192.168.117.23	192.168.117.23	22 hours ago	PLC	DNP3 (Identifier...)	0:0:3:a7:0:8:92:c6	SCHWEITZER EN...					
192.168.117.1	192.168.117.1	22 hours ago	Unknown	DNP3 (Identifier...)	0:0:23:a4:9:5:c2	CISCO SYSTEMS ...					
192.168.117.22	192.168.117.22	22 hours ago	PLC	DNP3 (Identifier...)	0:0:3:a7:0:8:97:c0	SCHWEITZER EN...					
192.168.117.25	192.168.117.25	22 hours ago	PLC	DNP3 (Identifier...)	0:0:cc1:0:2:0:9d:a	EATON CORPOR...					
192.168.117.7	192.168.117.7	22 hours ago	PLC	Siemens SICAM	0:0:e0:a8:0:19:0:be	SAT GMBH & CO.	15.01	CPC65 (6065)			
192.168.117.239	192.168.117.239	22 hours ago	Unknown	Siemens SICAM	0:0:c2:9:2:8:3:8	VMWWARE INC.					
192.168.117.8	192.168.117.8	22 hours ago	PLC	Siemens SICAM	0:0:e:a8:0:19:0:bb	SAT GMBH & CO.	15.01	CPC65 (6065)			
192.168.107.10	FC50507	22 hours ago	DCS Controller	Yokogawa VNet/IP	0:0:0:64:9:d:5:d:10	YOKOGAWA DIG...					
192.168.107.1	192.168.107.1	22 hours ago	Unknown	Yokogawa VNet/IP	0:0:0:64:9:d:7:3:d	YOKOGAWA DIG...					
192.168.107.2	192.168.107.2	22 hours ago	Unknown	Yokogawa VNet/IP	0:0:0:64:9:e:8:4:e	YOKOGAWA DIG...					
192.168.118.3	192.168.118.3	22 hours ago	PLC	Siemens S7	0:0:1:e:3:11:2:33	SIEMENS AG	3.2.6	6E57 315-6EH14...	0	4	
192.168.118.3	192.168.118.3	22 hours ago	PLC	Siemens S7	0:0:1:e:3:11:2:33	SIEMENS AG	3.2.6	6E57 315-9EH14...	1	2	
192.168.118.3	192.168.118.3	22 hours ago	PLC	Siemens S7	0:0:1:e:3:11:2:33	SIEMENS AG	3.2.6	6E57 315-8EH14...	1	2	

Load More...

## Task 4: View the Event Timeline

- This view will allow you a Forensic analysis of your alerts. You can choose to Hide or Unhide the User Operations or select more filter types from the "Add filter".

Microsoft | MicrosoftDefenderIoTSensor1 - 22.1.2

Home > Event timeline

**Defender for IoT | Event timeline**

Search | Create event | Refresh | Export

User Operations == Hide | Add filter | Reset filters

Discover

Overview  
Device map  
**Event timeline**  
Data mining  
Risk assessment  
Trends & statistics  
Attack vector  
Manage

System settings  
Custom alert rules  
Users  
Forwarding  
Support

Support

Event type	Time	Description
Device Detected	6/24/2022, 2:29:04 PM	Device 192.168.1.180 was detected
Device Connection Detected	6/24/2022, 2:29:04 PM	Connected devices 192.168.1.11 and 192.168.1.180
Device Detected	6/24/2022, 2:29:04 PM	Device 192.168.1.11 was detected
Firmware Update	6/23/2022, 5:30:28 PM	Client device 192.168.122.20 copied firmware on PLC 192.168.122.1:Client device 192.168.122.20 copied fir...
PLC Password Change	6/23/2022, 5:30:28 PM	Client device 192.168.122.20 requested PLC 192.168.122.1 to change password
PLC Reset	6/23/2022, 5:30:28 PM	Client device 192.168.122.20 requested PLC 192.168.122.1 to reset itself
PLC Start	6/23/2022, 5:30:28 PM	Client device 192.168.122.20 changed the PLC 192.168.122.1 mode to start
Firmware Update	6/23/2022, 5:30:28 PM	Client device 192.168.122.21 copied firmware on PLC 192.168.122.1
PLC Programming Mode Set	6/23/2022, 5:30:28 PM	Client device 192.168.122.20 tried to change PLC 192.168.122.1 mode to programming mode
Firmware Update	6/23/2022, 5:30:28 PM	Client device 192.168.122.21 copied firmware on PLC 192.168.122.2
PLC Password Change	6/23/2022, 5:30:28 PM	Client device 192.168.122.21 requested PLC 192.168.122.1 to change password
PLC Reset	6/23/2022, 5:30:28 PM	Client device 192.168.122.21 requested PLC 192.168.122.1 to reset itself

Load More...

## Task 5: Data Mining

- In this section you can create multiple custom reports. As an example, we will create a Report based on firmware updates versions. Click on + Create report to open the wizard.

The screenshot shows the Microsoft Defender for IoT interface with the 'Data mining' section selected. A 'Create report' button is highlighted with a pink box. The 'Create new report' dialog box is open, showing fields for Name, Description, and Category (set to 'Modules and Firmware Versions'). Other filter options like IP address, MAC address, Port, and Device group are also visible.

2. Assign a name and a description to your report. Pick “**Modules and Firmware Versions**” for Category, select “**Firmware Version (GENERIC)**” from “add filter”.

The screenshot shows the 'Create new report' dialog box with specific fields highlighted with pink boxes. The 'Name' field contains 'PLC Firmware Version', the 'Description' field contains 'Report showing the firmware version of the different PLCs.', and the 'Choose Category' dropdown is set to 'Modules and Firmware Versions'. The 'Firmware Version (GENERIC)' filter under 'Add filter type' is also highlighted with a pink box.

3. Your report will show up on the list under “My reports”.

The screenshot shows the Microsoft Defender for IoT interface. On the left, a sidebar lists various sections: Discover, Analyze, Manage, and Support. Under Analyze, 'Data mining' is selected and highlighted with a pink box. In the main content area, there's a 'Recommended' section with six cards: Programming Commands, Internet Activity, Excluded CVEs, Active Devices (Last 24 Hours), Remote Access, and CVEs. Below this is a 'My reports' section with a table. One row in the table, 'PLC Firmware Version', is highlighted with a pink box. The table has columns for Name, Description, and Last modified.

Name	Description	Last modified
PLC Firmware Version	Report showing the firmware version of the different PLCs.	2 minutes ago
ALL		4 days ago
test		3 months ago

4. You can export the report as pdf or csv.

This screenshot shows a detailed view of a report titled 'PLC Firmware Version'. At the top, there are navigation links: Refresh, Expand all, Collapse all, Export to CSV, Export to PDF, Snapshots, Manage report, and Edit mode. The 'Export to CSV' and 'Export to PDF' buttons are highlighted with a pink box. Below the title, the report content is described as 'Report showing the firmware version of the different PLCs.'

## Task 6: Generate a Risk Assessment report

1. On the Risk assessment page, run the assessment by clicking the "Generate report" button. You can download and view the report as pdf.

This screenshot shows the 'Risk assessment' page. On the left, the sidebar includes 'Discover', 'Analyze', 'Manage', and 'Support', with 'Risk assessment' selected and highlighted with a pink box. In the main area, there's a 'Reports list' table. The first row of the table, 'risk-assessment-report-4.pdf', is highlighted with a pink box. The table has columns for #, Name, Date Created, and Size.

#	Name	Date Created	Size
1	risk-assessment-report-4.pdf	just now	2 MB
2	risk-assessment-report-3.pdf	4 days ago	2 MB
3	risk-assessment-report-2.pdf	A month ago	1 MB
4	risk-assessment-report-1.pdf	3 months ago	1 MB

## Exercise 5: Cloud Connect your sensor

### Task 1: Create the cloud connected sensor on the Cloud Management portal

1. On the cloud management (Azure) portal, navigate to "Sites and sensors" and click on "Onboard OT sensor".

The screenshot shows the Microsoft Azure Cloud Management portal with the URL [https://portal.azure.com/#blade/Microsoft\\_Azure\\_IoT\\_Solutions/DefenderForIoTBlade/Overview](https://portal.azure.com/#blade/Microsoft_Azure_IoT_Solutions/DefenderForIoTBlade/Overview). The page title is "Defender for IoT | Sites and sensors". The top navigation bar includes "Search resources, services, and docs (G+)" and various icons. Below the title, there's a message about a trial subscription expiring. The main area shows statistics: 4 All sensors, 1 IoT, 2 OT cloud connected, and 1 OT. A sidebar on the left lists "Getting started", "Device inventory (Preview)", "Alerts (Preview)", and "Workbooks (Preview)". The "Management" section has a "Sites and sensors" button highlighted with a pink box. The main table lists four sensors, with the first one, "D4IOT-CxE-Site - D4IOT-CxE-Site", selected. The table columns include Sensor name, Sensor type, Zone, Subscription ..., Sensor version, Sensor status, Last connect..., Threat Intelli..., and Threat... .

2. Give the sensor a meaningful name, pick the subscription from the dropdown menu, and ensure that "cloud connected" is checked. Click on "Register".

The screenshot shows the "Step 3: Register this sensor with Microsoft Defender for IoT" form. It includes fields for "Sensor name" (with a pink box), "Subscription" (a dropdown menu with "Please select a subscription" and "Onboard subscription" options, both highlighted with a pink box), "Cloud connected" (a checked checkbox highlighted with a pink box), "Automatic Threat Intelligence updates" (an unchecked checkbox), "Sensor version" (set to "22.X and above"), "Site" (a dropdown menu with "No subscription has been selected" and "Create site" options), "Resource name" (a dropdown menu with "No subscription has been selected" and "Create site" options), "Display name" (a dropdown menu with "No subscription has been selected" and "Create zone" options), "Tags" (a key-value pair input field with "+Add tag" and a delete icon), and "Zone" (a dropdown menu with "No subscription has been selected" and "Create zone" options). At the bottom is a "Register" button.

3. The download for the activation starts immediately. Please check your downloads.

### Task 2: Upload the activation file to cloud connect your sensor.

1. Navigate back to your sensor and click on "System settings" -> "Sensor management" -> "Subscription and Activation Mode".

The screenshot shows the Microsoft Defender for IoT Sensor management interface. On the left, there's a navigation sidebar with sections like Discover, Analyze, and Manage. Under Manage, 'System settings' is selected and highlighted with a pink box. In the main content area, there are several cards: 'Software Update', 'Threat Intelligence', 'Subscription & Activation Mode' (which is also highlighted with a pink box), 'Backup & Restore', 'System Health Check', and 'SNMP MIB Monitoring'. The 'Subscription & Activation Mode' card has a sub-instruction: 'Upload an activation file to reactivate this sensor'.

2. Upload the activation file you downloaded in the previous step. Click on "Activate".

This screenshot shows the 'Subscription & Activation Mode' dialog box open on the right side of the screen. It contains fields for Activation Mode (set to 'Cloud Connected'), Activation Status (set to 'Active'), Tenant ID (a long GUID), Subscription ID (another GUID), and a file upload input field labeled 'Upload activation file:' which is currently empty and highlighted with a pink box. The background shows the same interface as the first screenshot, with the 'System settings' section still highlighted.

## Task 3: Verify Cloud connection

1. On the sensor console.

## 2. On the Cloud management console.

Sensor name	Sensor type	Zone	Subscription ...	Sensor version	Sensor status	Last connect...	Threat Intelli...	Threat Intelli...	Threa...
D4IOTsensor-TT	EloT	default	BuildEnv		Unavailable	--	-	--	...
sensor-Cyber	OT cloud co...	default	BuildEnv	22.1.3.4162	Disconnected	A month ago	5/25/2022	Automatic	...
test1	OT cloud co...	default	BuildEnv	22.1.3.4162	OK	19 minutes a...	7/11/2022	Automatic	...

## Exercise 6: Integrate with Microsoft Sentinel

### Task 1: Connecting Data Connectors

1. On the Azure portal, search for **Microsoft Sentinel**.

## 2. Create a new workspace.

3. Go to Configuration > Data Connectors > Search **Microsoft Defender for IoT** to connect Microsoft Defender for IoT to Microsoft Sentinel.

## 4. Click the Open Connector Page.

The screenshot shows the Microsoft Sentinel Data connectors page. On the left, there's a sidebar with various workspace names listed. The main area shows a summary of 133 Connectors and 35 Connected ones. A search bar at the top right allows filtering by provider, data type, and status. Below the summary, a table lists connectors, with 'Microsoft Defender for IoT' by Microsoft being highlighted. To the right, a detailed view of the Microsoft Defender for IoT connector is shown, including its status (Connected), provider (Microsoft), last log received (6 days ago), and a chart showing data received over time. A pink box highlights the 'Open connector page' button.

5. Review the instructions and click the “**Connect**” button to connect Microsoft Defender for IoT to Sentinel. If the connection continues to fail, this will most likely be due to the user not having the **“Contributor”** permissions and you may have missed the access step in the prerequisites.

The screenshot shows the Microsoft Defender for IoT (Preview) configuration page. It has sections for **Instructions** and **Next steps**. The **Prerequisites** section lists requirements: workspace (read and write permissions) and subscription (Contributor permissions). The **Configuration** section is titled **Connect Microsoft Defender for IoT to Microsoft Sentinel**. It asks to select subscriptions to connect. Two buttons are available: **Connect All** and **Disconnect All**. A search bar is present. A table lists subscriptions, with 'Azure Pass - Sponsorship' shown and its 'Status' set to **Disconnected**. A red box highlights the **Connect** button next to the 'Azure Pass - Sponsorship' row.

6. If connected correctly you should expect to see the Status change to “**Connected**” and the link light up green.

The screenshot shows the Microsoft Azure Microsoft Defender for IoT (Preview) configuration page. The top navigation bar includes the Microsoft Azure logo, a search bar, and various navigation icons. The main content area has a breadcrumb trail: Home > Microsoft Sentinel > Microsoft Sentinel > Microsoft Defender for IoT (Preview). The left sidebar has tabs for 'Instructions' (selected) and 'Next steps'. The main content starts with a 'Prerequisites' section, which lists requirements for workspace and subscription permissions. Below this is a 'Configuration' section with a 'Configuration' icon. It explains how to connect Microsoft Defender for IoT to Microsoft Sentinel by selecting 'Connect' next to each subscription whose IoT Hub's alerts you want to stream. A 'Search' input field is provided. A table lists a single subscription: 'Azure Pass - Sponsorship'. The 'Status' column for this subscription is highlighted with a red box and shows 'Connected' with a green checkmark icon. There are also 'Connect' and 'Disconnect' buttons for this row.

7.Click on “Next steps” tab to enable Out of the Box alerts and Workbooks

The screenshot shows the Microsoft Defender for IoT (Preview) dashboard. At the top left, there's a navigation bar with 'Home > Microsoft Sentinel > Microsoft Sentinel > Microsoft Defender for IoT (Preview)'. Below the navigation, there's a sidebar with 'Instructions' and 'Recommended workbooks (1)'. The main area has a heading 'Azure Defender for IoT Alerts' by Microsoft. Underneath, there are sections for 'Query samples (2)', 'All logs', and 'Summarize by severity'. In the 'Relevant analytics templates (1)' section, a table lists a template named 'Create incidents based on Azure Defender f...' with a 'Severity' of 'High'. To the right of the table is a 'CREATE RULE' button with a 'Create rule' link. A red box highlights the 'Next steps' link in the sidebar and the 'Create rule' button.

7. Fill in the “Name” and click **Review and Create**, followed by **Create**. This is enabling incidents to be created based on the Azure Defender IoT alerts that are ingested into Sentinel.

The screenshot shows the 'Analytics rule wizard - Create new rule from template' page. The title is 'Create incidents based on Azure Defender for IOT alerts'. Below the title, there are tabs: 'General', 'Automated response', and 'Review and create', with 'Review and create' being the active tab. A green banner at the top says 'Validation passed.' Below the tabs, there's a section for 'Analytics rule details' with fields: Name ('MyNewRule'), Description ('Create incidents based on all alerts generated in Azure Defender for IOT'), and Status ('Enabled'). Under 'Analytics rule logic', there are settings for 'Microsoft security service' (set to 'Microsoft Defender for IoT'), 'Filter by severity' (set to 'Any'), 'Include by alert name(s)' (set to 'Any'), and 'Exclude by alert name(s)' (set to 'Any'). In the 'Automated response' section, 'Incident trigger (preview)' is listed as 'Not configured'. At the bottom, there are 'Previous' and 'Create' buttons, with 'Create' being highlighted with a red box.

8. Additionally, you can create the rule not only on the data connectors page but also on Microsoft Sentinel “**Analytics**” blade. Go to the “**Rule Templates**” tab and filter data sources by “Microsoft Defender for IoT” to see all the alerts from the IoT connector.

The screenshot shows the Microsoft Sentinel Analytics blade. On the left, there's a navigation pane with sections like General, Threat management, Content management, and Configuration. Under Configuration, the 'Data connectors' section is expanded, and the 'Analytics' item is highlighted with a pink rectangle. In the main content area, the 'Rule templates' tab is selected. A search bar at the top has 'Data Sources : Microsoft Defender for IoT' typed into it and is highlighted with a pink rectangle. Below the search bar, there's a table with columns: Severity, Name, Rule type, Data sources, Tactics, Techniques, and Source name. The 'Data sources' column shows 'Microsoft Defender for IoT' for several rows. At the bottom of the table, there's a note: 'Create incidents based on Microsoft Defender for IoT'. The top right of the blade has a 'Rules by severity' chart and a 'LEARN MORE About analytics rules' link.

## Task 2: Acknowledge Alerts and Re-run PCAPs

1. Go back to your sensor console, select all the alerts, and click on “**Learn**”. The reason we are doing this is so we can re-run the alerts to show how they are sent and analyzed by Sentinel.

The screenshot shows the Microsoft Defender for IoT Sensor1 - 22.1.2 Alerts blade. On the left, there's a navigation pane with sections like Discover, Analyze, Manage, and Support. The 'Alerts' item is selected and highlighted with a pink rectangle. In the main content area, there's a table showing 22 alerts. The columns are: Severity, Name, Engine, Detection time, Status, and Source Device. The 'Severity' column is sorted in descending order (Critical at the top). The 'Learn' button at the top right of the alert list is highlighted with a pink rectangle. The table shows various alert types such as Policy Violation, Anomaly, and Operational, with detection times ranging from 2 weeks ago to 3 months ago and source devices from 192.168.110.21 to 192.168.109.2.

2. From the **System Settings** tab, Click the **Play All** on the PCAP Files to replay simulating the alerts.

The screenshot shows two windows side-by-side. On the left is the 'System settings' page for a sensor named 'MicrosoftDefenderIoTSensor1 - 22.1.2'. The 'Discover' section is expanded, showing 'Overview', 'Device map', 'Device inventory', and 'Alerts'. The 'Analyze' section includes 'Event timeline', 'Data mining', 'Risk assessment', 'Trends & statistics', and 'Attack vector'. The 'Manage' section has 'System settings' selected, along with 'Custom alert rules', 'Users', and 'Forwarding'. The 'Support' section includes 'Support'. On the right is the 'PCAP PLAYER' window, which allows uploading and replaying PCAP files. A file named 'pcap\_wednesday.pcapng' is listed, and the 'Play All' button is highlighted with a red box.

## Task 3: Sentinel interaction with IoT Incidents

1. Go back to the Sentinel console and under the **Threat Management** section, select the **Incidents** tab. Filter by Product Name **Azure Defender for IoT**.

The screenshot shows the Microsoft Sentinel 'Incidents' page. The left sidebar lists sections like General, Threat management (with 'Incidents' selected), Content management, Configuration, and Support. The main area displays incident statistics: 16 Open incidents, 16 New incidents, and 0 Active incidents. Below this is a chart titled 'Open incidents by severity' showing counts for High (4), Medium (10), Low (2), and Informational (0). A search bar at the top is set to 'Search resources, services, and docs (G+)'. The main table lists incidents with columns for Severity, Incident ID, Title, Alerts, Product names, Created time, Last update time, and Owner. A filter bar at the top of the table specifies 'Product name : Microsoft Defender for IoT' and 'Owner : All'. The first few rows of the table are:

Severity	Incident ID	Title	Alerts	Product names	Created time	Last update time	Owner
High	16	Unauthorized Internet Conne...	1	Microsoft Defender ...	01/25/22, 04:42 PM	01/25/22, 04:42 PM	Unas...
High	15	Unauthorized Internet Conne...	1	Microsoft Defender ...	01/25/22, 04:41 PM	01/25/22, 04:41 PM	Unas...
Low	14	Outstation Restarted	1	Microsoft Defender ...	01/25/22, 04:41 PM	01/25/22, 04:41 PM	Unas...
Medium	13	BACNet Operation Failed	1	Microsoft Defender ...	01/25/22, 04:41 PM	01/25/22, 04:41 PM	Unas...
Medium	12	Firmware Change Detected	1	Microsoft Defender ...	01/25/22, 04:41 PM	01/25/22, 04:41 PM	Unas...
Low	11	Controller Stop	1	Microsoft Defender ...	01/25/22, 04:41 PM	01/25/22, 04:41 PM	Unas...
High	10	Unauthorized Internet Conne...	1	Microsoft Defender ...	01/25/22, 04:41 PM	01/25/22, 04:41 PM	Unas...
Medium	9	EtherNet/IP CIP Service Requ...	1	Microsoft Defender ...	01/25/22, 04:41 PM	01/25/22, 04:41 PM	Unas...
Medium	8	BACNet Operation Failed	1	Microsoft Defender ...	01/25/22, 04:41 PM	01/25/22, 04:41 PM	Unas...
High	7	Unauthorized Internet Conne...	1	Microsoft Defender ...	01/25/22, 04:41 PM	01/25/22, 04:41 PM	Unas...
Medium	6	Unknown Object Sent to Out...	1	Microsoft Defender ...	01/25/22, 04:41 PM	01/25/22, 04:41 PM	Unas...
Medium	5	BACNet Operation Failed	1	Microsoft Defender ...	01/25/22, 04:40 PM	01/25/22, 04:40 PM	Unas...
Medium	4	BACNet Operation Failed	1	Microsoft Defender ...	01/25/22, 04:40 PM	01/25/22, 04:40 PM	Unas...
Medium	3	BACNet Operation Failed	1	Microsoft Defender ...	01/25/22, 04:40 PM	01/25/22, 04:40 PM	Unas...
Medium	2	BACNet Operation Failed	1	Microsoft Defender ...	01/25/22, 04:40 PM	01/25/22, 04:40 PM	Unas...

2. Select one of the alerts and click **View full details**

Microsoft Sentinel | Incidents

Selected workspace: mylogoworkspace-msiot2

General

Threat management

Content management

Configuration

Incidents

Workbooks

Hunting

Notebooks

Entity behavior

Threat intelligence

Content hub (Preview)

Repositories (Preview)

Community

Data connectors

Analytics

Watchlist

Automation

Settings

Open incidents: 16

New incidents: 16

Active incidents: 0

Open incidents by severity:

- High (4)
- Medium (10)
- Low (2)
- Informational (0)

Search by ID, title, tags, owner or product

Severity: All

Status: 2 selected

Product name: Microsoft Defender for IoT

Owner: All

Description: Unauthorized Internet Connectivity Detected

Incident ID: 16

Investigate in Microsoft Defender for IoT

Owner: Unassigned

Status: New

Severity: High

Alerts: 1

Events: 0

Bookmarks: 0

Last update time: 01/25/22, 04:42 PM

Creation time: 01/25/22, 04:42 PM

Entities (4): 141.81.0.139, 10.200.1.124, HUB-MD4IOT-MST..., 10.200.1.124

Tactics (1): Initial Access

View full details >

Incident workbook

Incident Overview

Analytics rule

MyNewRule

Tags

**View full details**

Actions

3. It will take you to this screen to get all the information relative to the incident. This allows analyst to get more details on the entity including what other alerts made up the incident, playbooks to enrich the context of the alert, and comments section to leave details on what the analyst discovered during review or how they came to the determination to dismiss the incident.

Microsoft Azure

Home > Microsoft Sentinel >

Incident

Incident ID: 16

Refresh

Unauthorized Internet Connectivity Detected

Incident ID: 16

Investigate in Microsoft Defender for IoT

Owner: Unassigned

Status: New

Severity: High

Description: A source device defined as part of your network is communicating with Internet addresses. The source is not authorized to communicate with Internet addresses.

Evidence

Events: N/A

Alerts: 1

Bookmarks: 0

Last update time: 01/25/22, 04:42 PM

Creation time: 01/25/22, 04:42 PM

Entities (4): 141.81.0.139, 10.200.1.124, HUB-MD4IOT-MST..., 10.200.1.124

Tactics (1): Initial Access

View full details >

Incident workbook

Incident Overview

Analytics rule

MyNewRule

Tags

**Investigate**

Actions

Timeline

Alerts

Bookmarks

Entities

Comments

Search

Timeline content: All

Severity: All

Tactics: All

Jan 25 4:41 PM Unauthorized Internet Connectivity Detected

High | Detected by Microsoft Defender for IoT | Tactics: Initial Access

View(playbooks)

Unauthorized Internet Connectivity Detected

Description: A source device defined as part of your network is communicating with Internet addresses. The source is not authorized to communicate with Internet addresses.

Severity: High

Status: New

Events: N/A

Product name: Microsoft Defender for IoT

Entities (4): 141.81.0.139, 10.200.1.124, HUB-MD4IOT-MST..., 10.200.1.124

Tactics (1): Initial Access

System alert ID: 741e1606-64de-5f93-8336...

Last update time: 01/25/22, 04:41 PM

Updates: 0

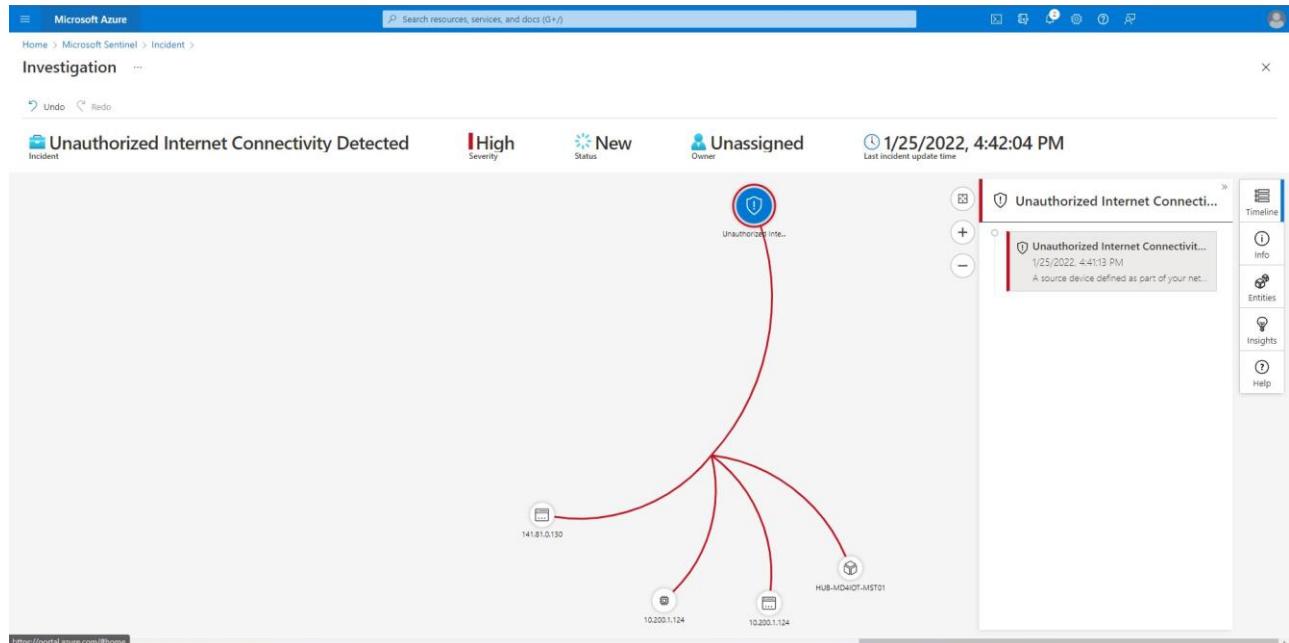
Start time: 01/25/22, 04:41 PM

End time: 01/25/22, 04:41 PM

Alert link: https://portal.azure.com/#blade/Microsoft\_Azure\_IoT\_Defender/IAlert...

Remediation steps

4. By clicking the **Investigate** button, you can dig deeper in the cause of the incident and the relation to other incidents.



## Task 4: Kusto Query Language to Find Alert Details

1. Navigate to the “Logs” tab and run the queries provided below, and view the results.

The screenshot shows the Microsoft Azure Microsoft Sentinel Logs view. A query is being run: "SecurityAlert | where ProviderName contains "IoTSecurity"". The results table shows completed alerts from the last 24 hours:

TimeGenerated (UTC)	DisplayName	AlertName	AlertSeverity	Description
1/25/2022, 3:41:27.651 PM	Unknown Object Sent to Outstation	Unknown Object Sent to Outstation	Medium	The destination device received an invalid request.
1/25/2022, 3:42:27.511 PM	Outstation Restarts Frequently	Outstation Restarts Frequently	Low	An excessive number of cold restarts were detected on a source device.
1/25/2022, 3:42:27.464 PM	Firmware Change Detected	Firmware Change Detected	Medium	Firmware was updated on a source device. This may be automatic.
1/25/2022, 3:43:27.361 PM	Port Scan Detected	Port Scan Detected	High	A source device was detected scanning network devices. This indicates a potential security threat.
1/25/2022, 3:44:27.356 PM	Port Scan Detected	Port Scan Detected	High	A source device was detected scanning network devices. This indicates a potential security threat.
1/25/2022, 3:43:27.373 PM	Unauthorized Internet Connectivity Detected	Unauthorized Internet Connectivity Detected	High	A source device defined as part of your network is communicating with an external network.
1/25/2022, 3:46:27.499 PM	BACNet Operation Failed	BACNet Operation Failed	Medium	A server returned an error code. This indicates a server error.
1/25/2022, 3:42:27.473 PM	Outstation Restarted	Outstation Restarted	Low	A cold restart was detected on a source device. This means the device has been turned off and back on again.
1/25/2022, 3:41:27.324 PM	BACNet Operation Failed	BACNet Operation Failed	Medium	A server returned an error code. This indicates a server error.
1/25/2022, 3:41:27.443 PM	EtherNet/IP CIP Service Request Failed	EtherNet/IP CIP Service Request Failed	Medium	A server returned an error code. This indicates a server error.
1/25/2022, 3:41:27.407 PM	Controller Stop	Controller Stop	Low	The source device sent a stop command to a destination component.
1/25/2022, 3:41:27.384 PM	BACNet Operation Failed	BACNet Operation Failed	Medium	A server returned an error code. This indicates a server error.

The screenshot shows the Microsoft Defender for IoT Query Editor interface. At the top, a query is displayed: `SecurityAlert | where CompromisedEntity == "hub-md4iot-mst01"`. Below the query bar are various navigation and action buttons: Run, Time range: Last 7 days, Save, Share, New alert rule, Export, Pin to dashboard, and Format query. The main area shows the results of the query. The results table has columns: TimeGenerated [UTC], DisplayName, AlertName, AlertSeverity, and Description. The results are as follows:

TimeGenerated [UTC]	DisplayName	AlertName	AlertSeverity	Description
10/1/2021, 4:00:04.420 PM	Unauthorized Internet Connectivity Det...	Unauthorized Internet Connectivity Det...	High	A source devi...
10/1/2021, 4:00:04.087 PM	BACNet Operation Failed	BACNet Operation Failed	Medium	A server return...
10/1/2021, 4:00:07.358 PM	Controller Stop	Controller Stop	Low	The source devi...
10/1/2021, 4:00:07.445 PM	Port Scan Detected	Port Scan Detected	High	A source devi...

## Exercise 6: Clean Up

### Task 1: Delete resources

It is a best practice to delete all your resources after the training.

Search for the Resource Group created for this training.

Select Delete resource group on the top right side.

Enter your-resource-group-name for **TYPE THE RESOURCE GROUP NAME** and select Delete. This operation will take a few minutes.

After that is done go to Microsoft Defender for IoT and deactivate the subscription.