Fire Force Project Completion Presentation

Team introduction

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Project Introduction

Key Achievements

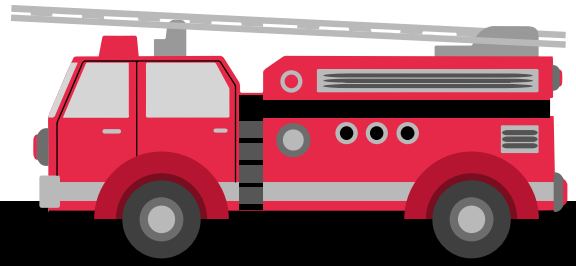
- Updated and improved computer network system in Endicott Building.
  - Created new design of computer network system
  - Configured VLANs to separate all sub-networks
  - Configured DHCP, DNS , HTTP servers
- Installed Fire detection system.
  - Installed IoT devices:
    - Smoke Detectors
    - Smart Doors
    - Sprinklers
    - Sirens

Design Limitations

- Implement only IoT devices that provides CISCO PT
- Existing computer network and fire detection designs were not provided to compare improvements with new design
- Physical layer of CISCO PT doesn't allow us to make more than one floor in a building

Background of Problem

- Recently, the wired and wireless network of Endicott Building has slowed down severely
- Endicott Building fire detection system can be a threat to professor's live due to slow network system.



Summary of Problem

Problem Definition

W19 building has slow computer network system and poor fire detection system which can lead to professors live being in danger.

Design Purpose

- Design the secure computer network system
- Implement smart and safe fire detection system

Problem Resolution

Designing an improved computer network system with latest CISCO devices and implement smart detection system by using CISCO PT to save professors' life from potential fire

Design Methods

- Using CISCO PT
- Creating Blueprint of Endicott Building(W19)
- Designing Multilayer Network and separating it by using VLANs configuration
- Creating Remote IoT monitor for fire detection system

Description of Final Design

Step 1. Blueprint

Decision making

As physical layer of CISCO PT doesn't allow changing the design of default buildings. We had to figure out how to create W19 layout. So there were two options :

1)Make simulation of W19 building by using default building layout
2)Create blueprint of the building

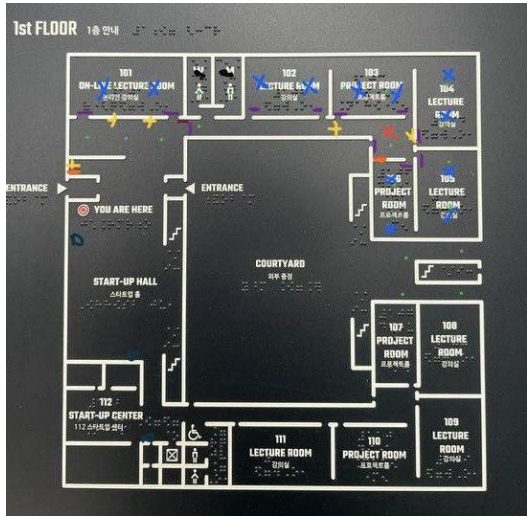
Team's choice was: **BLUEPRINT**

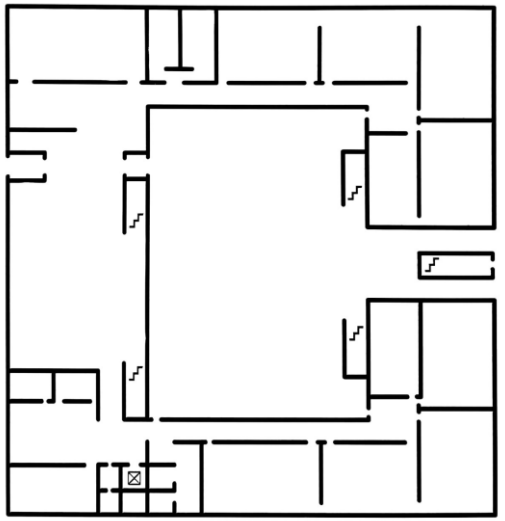
Solving Challenges

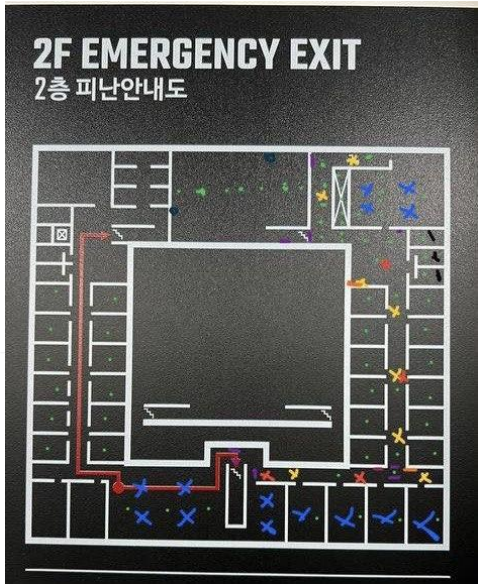
✓ Finding a pattern for blueprint
Solution: Take picture of emergency exits in W19

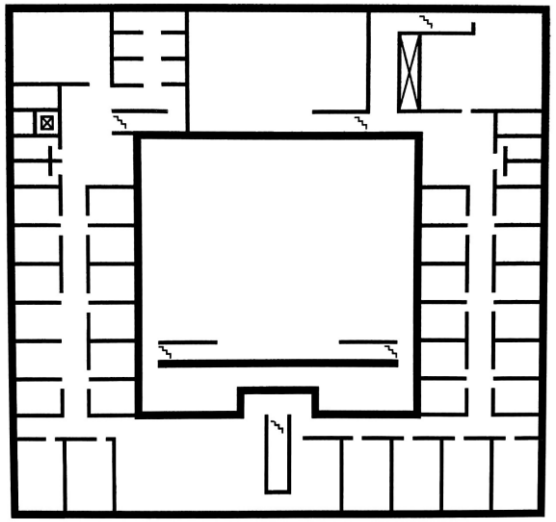
✓ Convert photo into digital blueprint
Solution: An image of the emergency exits was changed using the photoshop program. The outline of the map was repainted in black and transferred to a white background.

✓ Create two floors
Solution: Change backgrounds of 2 default buildings as a first and second floor









Description of Final Design

Step 2. Connecting IoT devices

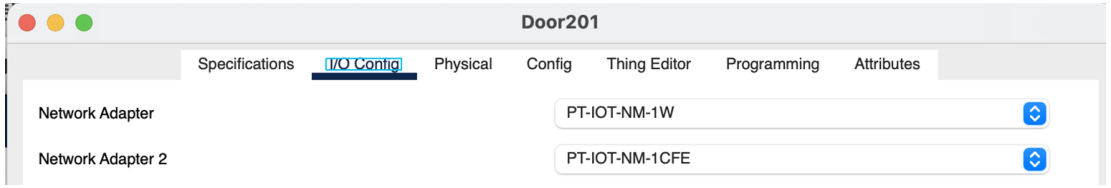
Decision making

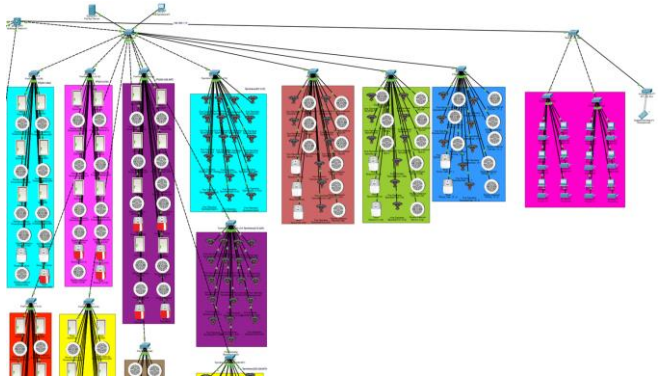
The latest version of CPT allows to connect IoT devices only by wireless connection to AP(by default), so the only way to avoid wireless connection is to use **MCU,**
So team decided to change configuration of port of each IoT device and make wired connection between IoT devices

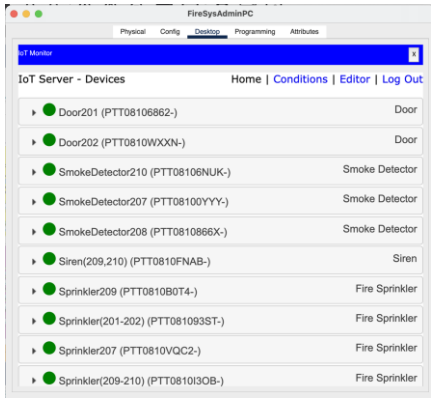
Solving Challenges

✓ IoT devices in the newest versions of CPT does not have wired connection by default
Solution: Change configuration of each IoT devices port in “ADVANCED” configuration of IoT devices

✓ Connect all IoT devices to one IoT monitor
Solution: Create IoT remote monitor server and connect all devices to one IoT monitor







Description of Final Design

Step 3. Separating subnetworks

Decision making

To reduce packet traffic, all subnetworks (Professor's rooms, Management Office, WiFi, Fire System) should have been divided from each other.

Decision: Configure VLANs to each subnetwork.

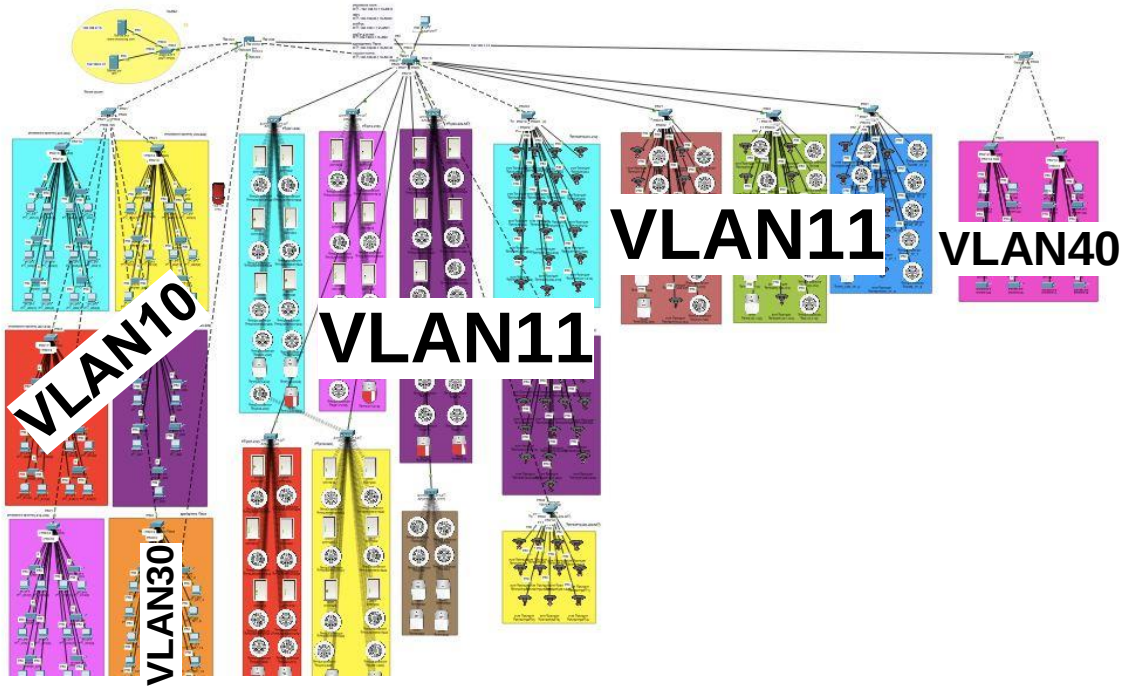
Reason: Easiest way to separate subnetwork from each other

Solving Challenges

✓ Configuring DHCP server for each subnetwork
Solution: Configure DHCP addresses pool in multilayer switch.

✓ Getting access from one VLAN to another
Solution: Configure switchport trunks to get access from one VLAN to another VLAN

✓ Getting access to DNS server from other VLANS
Solution: Create other VLAN for DNS and HTTP switch and make trunk between them



Description of Final Design

Step 4. Connect two floors

Decision making

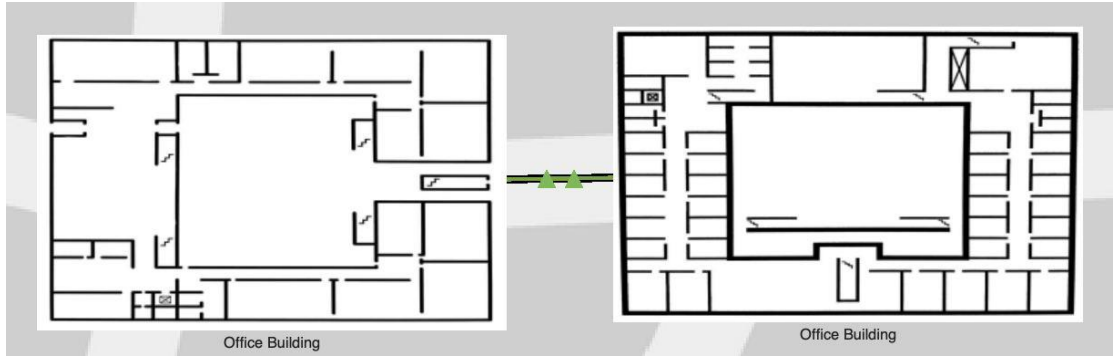
As stated before decision was to make two buildings as a two floors, so according to design, **team created wired connection of network and fire detection systems between two buildings.**

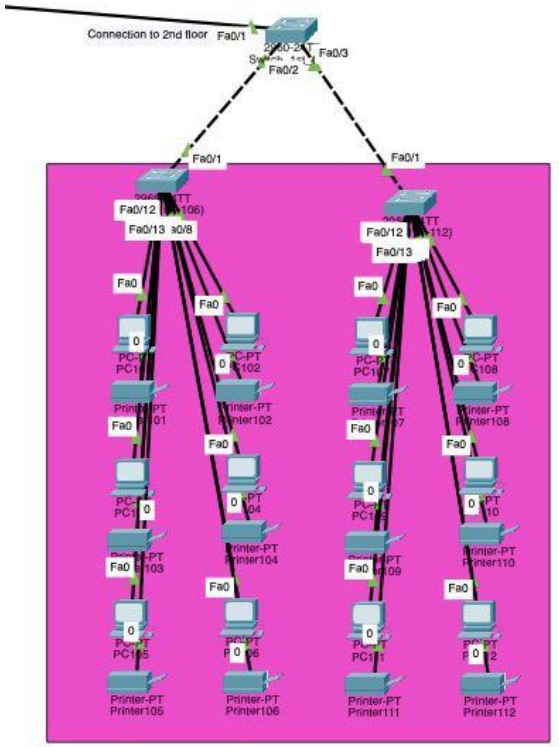
PS: This decision was made because of time limitations(explanation later)

Solving Challenges

✓ Connect fire detection system of the first and second floor
Solution: Use wired connected switch and locate it in closet of the first floor

✓ Create a subnetwork of all computer rooms in the first floor
Solution: Configure one more VLAN network for first floor PCs and connect it to multilayer switch by using trunks





Product and Prices

Multilayer Switch

Model: WS-C3650-24PS-S

Description:
Cisco Catalyst 3650
24 Port PoE 4x1G
Uplink IP Base

$3,910

Switches

Model: WS-C2960-24TC-L

Description:
Catalyst 2960 24
10/100 + 2T/SFP LAN
Base Image

$368

Access Points

Model: CON-SSSW-CW9164IA

Description:
SSPT NO RMA
Catalyst 9164I AP
(W6E, tri-band 4x4) w/

$89

Total Price

Multilayer Switch: 1

Switches: 24

Access Points: 3

$13,000

₩ 17,162,860

Conclusion and Recommendation

Conclusions

✓ Generally, the main purpose of design - creating improved network with fire detection system has been achieved

✓ So professor's life is successfully saved!

✓ Created design for sure has weaknesses and disadvantages

Therefore, there are some suggestions how to improve created design:

Suggestions

✓ Improve IoT devices connection system to make them work faster by creating a better configuration for them

✓ Create more precise design model of the building by adding ALL of the existing devices(not only pc and printer)

✓ Add more IoT devices to improve fire safety system(message alert system, temperature detection etc)

✓ Discover what network cisco devices are used in the W19 building now, to efficiently improve network system

Outcome if given more 2 weeks

✓ Configure FTP server and email system in network design

✓ Try to implement message alert

✓ Create routing system

✓ Design better connection between first and second floors

✓ Add more IoT devices

✓ Create smart system in classrooms(smart curtains, smart lights, smart windows etc)

Our laptops after using CISCO PT

Thank you for your Attention!