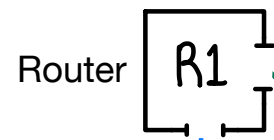
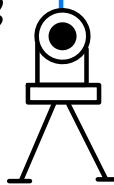


Local Address: 192.168.1.1
Subnet Mask: 255.255.255.0



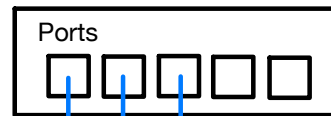
192.168.100.88

Gateway: 192.168.100.1
Netmask: 255.255.255.0

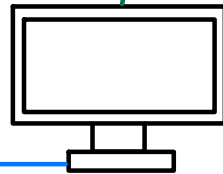


URL rtsp://admin:admin@192.168.100.88:554

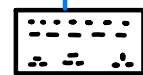
Internet



Switch



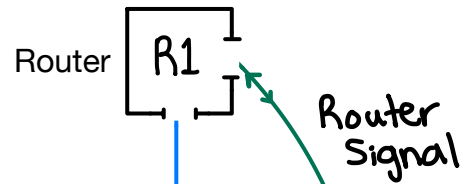
Address: 192.168.100.100
Subnet Mask: 255.255.255.0
Router: 192.168.100.1
DNS: 10.43.0.18
10.43.0.19



ATEM Switcher

Application Layer
Transport Layer
Network Layer
Data Link Layer
Physical Layer

Local Address: 192.168.1.1
Subnet Mask: 255.255.255.0



Address: 192.168.100.88
Gateway: 192.168.100.1
Net mask: 255.255.255.0

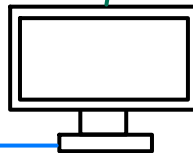


Switch

Ports

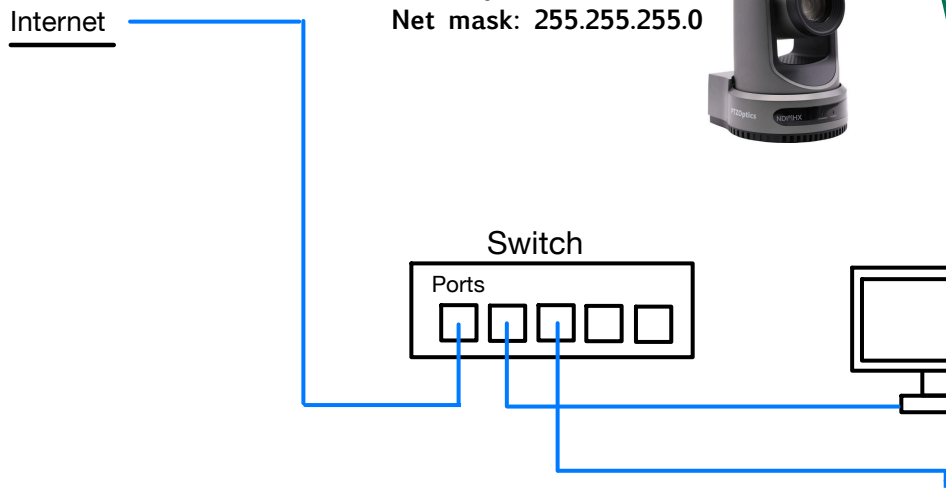


Address: 192.168.100.100
Subnet Mask: 255.255.255.0
Router: 192.168.100.1
DNS: 10.43.0.18
10:43.0.19



ATEM Switcher

Internet



How to connect to PTZ Camera using Router

Address: 192.168.100.100

Subnet Mask: 255.255.255.0

Router: 192.168.100.1

DNS: 10.43.0.18

10:43.0.19



Wireless Connection

Local Address: 192.168.1.1

Subnet Mask: 255.255.255.0



Ethernet Link

Address: 192.168.100.88

Gateway: 192.168.100.1

Net mask: 255.255.255.0



Lower level process (No need to fully understand)

Terms:

ARP (Address Resolution Protocol)

ICMP (Internet Control Message Protocol)

ARP can send request and reply

ICMP can send ping and trace route request.

What is going on inside the router:

Router:

Send ARP Request

Send ICMP Ping

Send ICMP Echo

MacBook wants to communicate with the PTZ camera, so it sends a packet to the router saying.

Protocol (ARP)

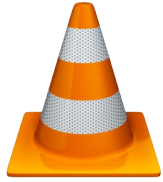
“Source (MacBook’s MAC address) Destination Broadcast...

Who has 192.168.100.88? Tell 192.168.1.1

Protocol (ARP)

Source (PTZ’s MAC address) Destination (MacBook’s MAC address)...
192.168.100.88 is at (PTZ’s MAC address).

VLC (VideoLan Client)



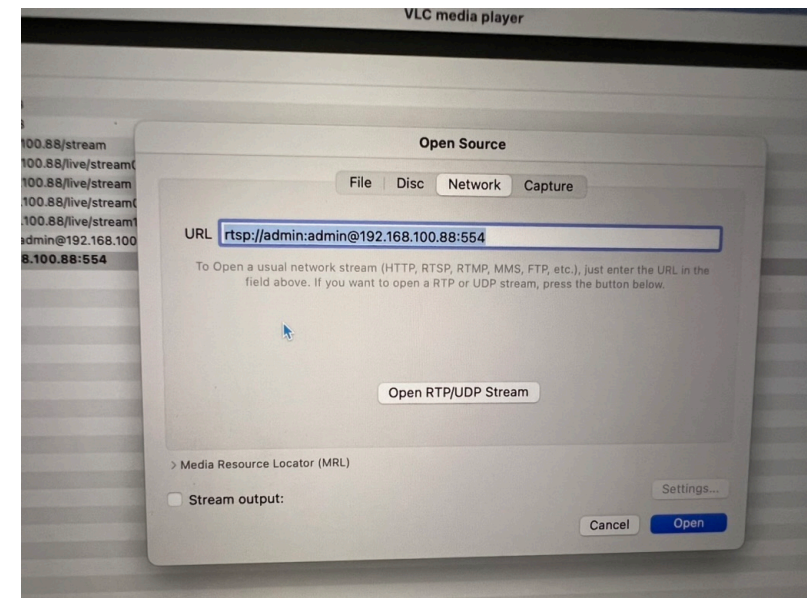
Click on VLC

https://cseweb.ucsd.edu:443/classes/fa24/cse127-ab/lectures/nr=7&lang=en#slides

Labels: scheme (https), domain (cseweb.ucsd.edu), port (443), path (/classes/fa24/cse127-ab/lectures), query string (nr=7&lang=en), fragment id (#slides)

URL: rtsp://admin:admin@192.168.100.88:554

Labels: Scheme (rtsp), Domain (admin:admin@192.168.100.88), Port (554)



Note:

If you forget router's password, you can simply press and hold on the reset button for around 10 seconds. This will factory reset it, allowing you to log in using the default username and password (admin)

Real-Time Streaming Protocol

Username: admin

:

Password: admin

This is the default username and password of the router.
(Make sure to change password to prevent someone from accessing router)

@ The IP address your PTZ camera is at. In this example, the IP address is 192.168.100.88
Port number will be 554.

Port 554 protocol can be both TCP. (Transport Control Protocol) and UDP (User Datagram Protocol)

- You can think of TCP as a delivery driver that kindly delivers your item to your front door.
- UDP in the other hand delivers your packets much quicker than TCP, however your order has a high chance of getting damaged or not showing up at all. It is however great for streaming since it's very fast.

< > USB 10/100/1000 LAN



USB 10/100/1000 LAN

Connected

Details...

IPv4 Configured

Manually

IP address 192.168.100.100

Subnet mask 255.255.255.0

Router 192.168.100.1

DNS Servers DNS Servers

Search Domains Search Domains

Delete Service...

Make Inactive



Lan Settings

IP Configuration Type: Fixed IP Address
IP Address: 192.168.100.88
Subnet Mask: 255.255.255.0
Gateway: 192.168.100.1
DNS Address: 8.8.8.8
MAC Address: D8 : E1 : 8E : 0E : 0C : B0

Apply

Cancel

Port Settings

HTTP Port number: 80 (80)
RTSP Port: 554 (554)
PTZ Port: 5678 (5678)

Control Protocol Settings

Visca Address: 1 (1~7)
Pelco-D Address: 0 (0~255)
Pelco-P Address: 0 (0~31)

RTMP Settings

First stream: ☐ On ☒ Off ☐ Video ☐ Audio
MRL: rtmp://192.168.100.138/live/stream0
Second stream: ☐ On ☒ Off ☐ Video ☐ Audio
MRL: rtmp://192.168.100.138/live/stream1

RTSP Settings

RTSP Auth: ☐ On ☒ Off

ONVIF Settings

ONVIF: ☐ On ☒ Off

ONVIF Auth: ☐ On ☒ Off

Multicast Settings

Multicast: ☐ On ☒ Off

Address: 224.1.2.3
Port: 6688

SDK Settings

Active Connection: ☐ On ☒ Off

Address: 192.168.100.138
Port: 1234

NTP Settings

NTP time sync: ☐ On ☒ Off

Server address: cn.ntp.org.cn

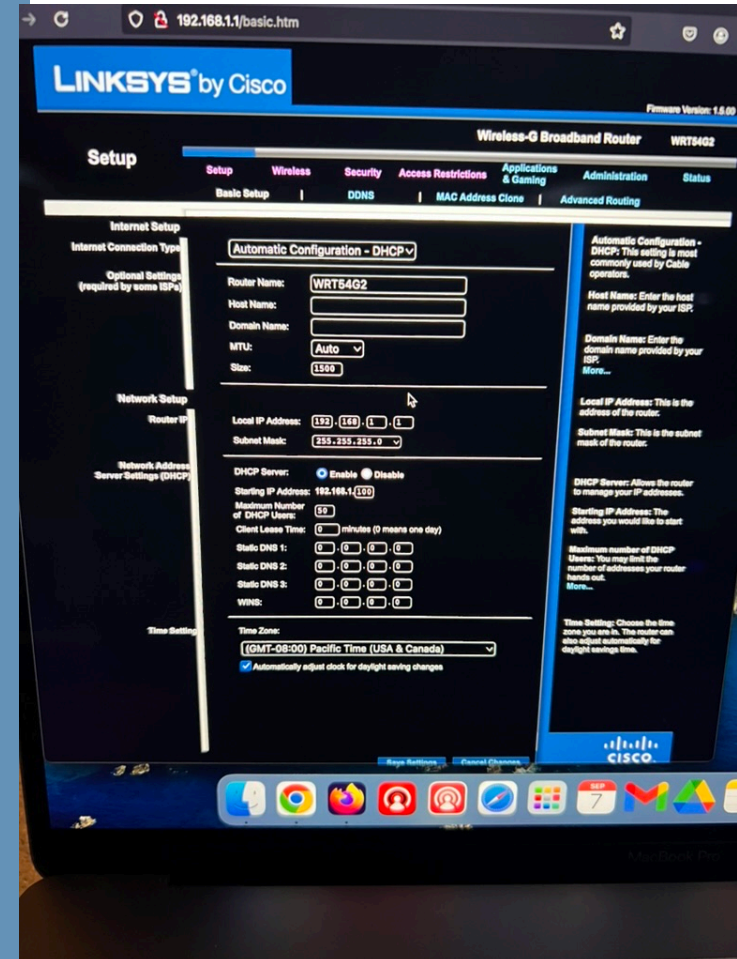
Time interval: 1440 minutes

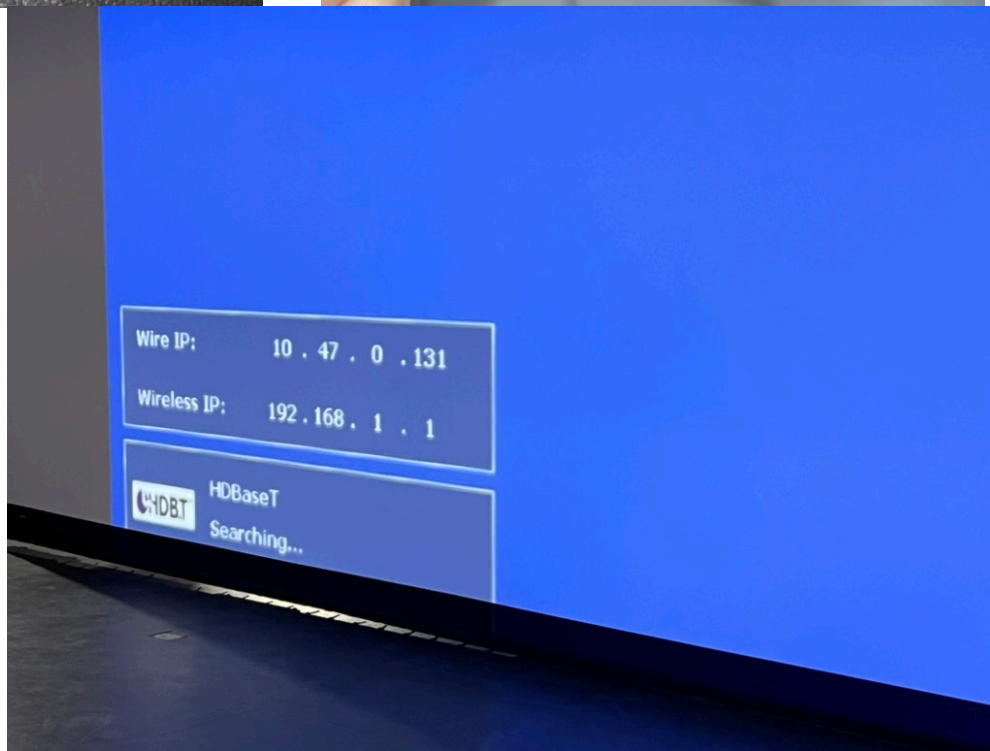
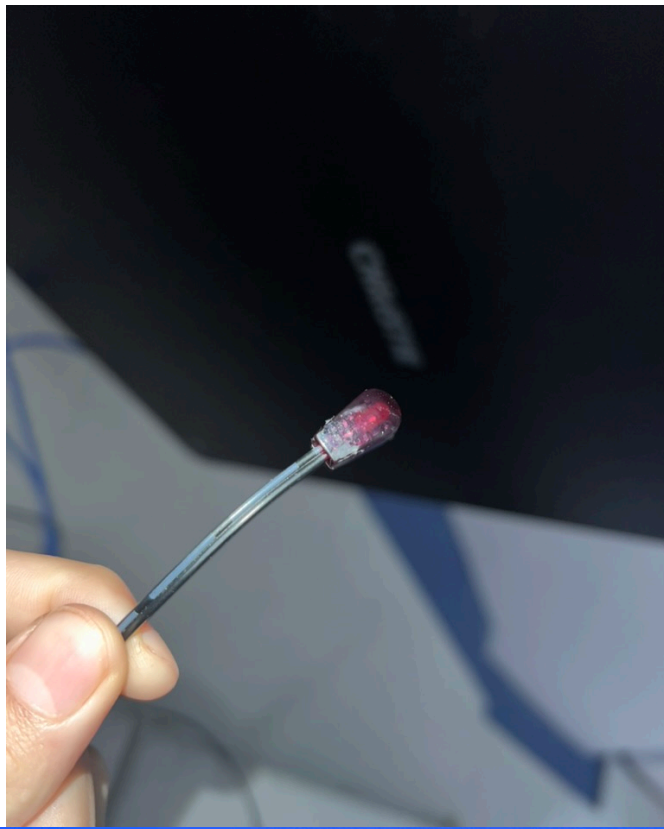
Main time show: ☐ On ☒ Off

Position: X 0 Y 0 (0~100)

Sub time show: ☐ On ☒ Off

Position: X 0 Y 0 (0~100)

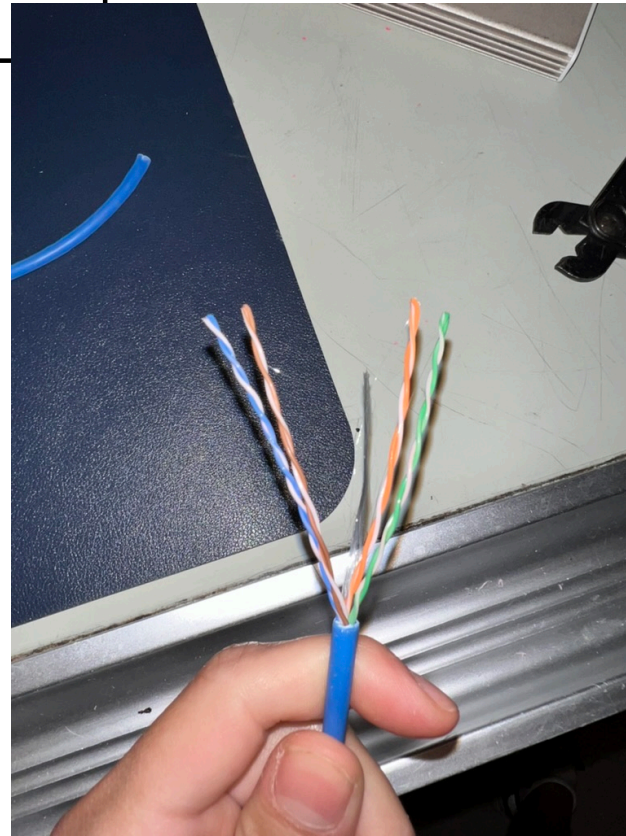
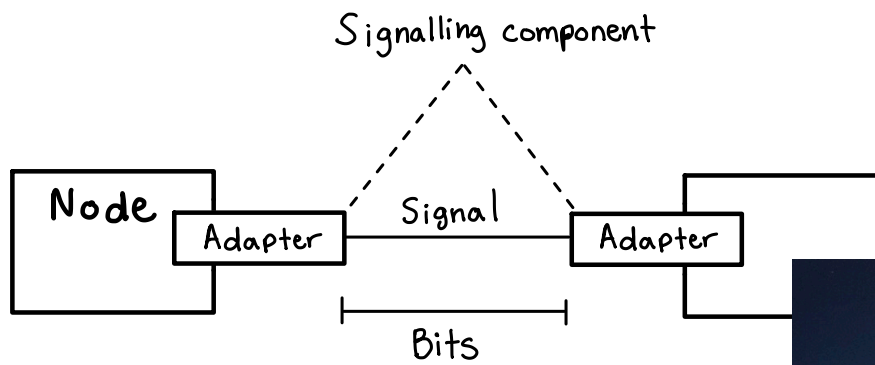




Physical Link

Layer 1

Network Adapter



Data Link Layer

Layer 2

Ethernet Header

ARP messages are link-layer frames (e.g. Ethernet/WiFi)

ARP requests are broadcast (on the local subnet)

Anyone can send an ARP reply

<https://www.netgear.com/business/wired/switches/plus/gs808e/>

https://www.bhphotovideo.com/c/product/1642113-REG/netgear_gs308ep_100nas_8_port_gigabit_ethernet_poe.html?ap=y&ap=y&smp=y&smp=y&store=420&lsft=BI%3A514&gad_source=1&gbraid=0AAAAAD7yMh2_gAMhKLkmbx8aUfHNWDJoS&gclid=EAIaIQobChMIzv_dxa-KigMVTcNECB26qRISEAQYASABEgKBI_D_BwE

IP Header

- Router speaks IP
- Think of a router as something that handles and sends packets.
- Just because you have a router doesn't mean you can connect to WiFi.

Transport Layer

TCP or UDP

Layer 4

Application Layer

Layer 7

(DNS) Domain Network System

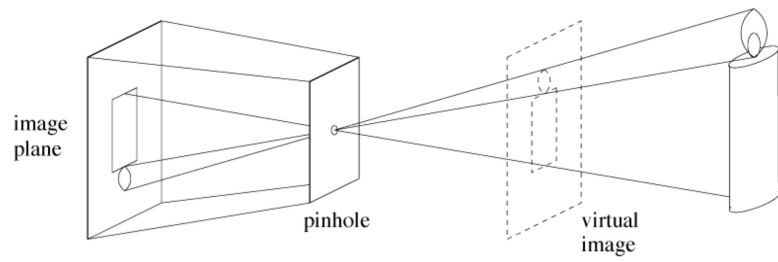
(HTTP) Hyper Text Transfer Protocol

(DHCP) Dynamic Host Control Protocol

↳ Is what helps give you your IP address

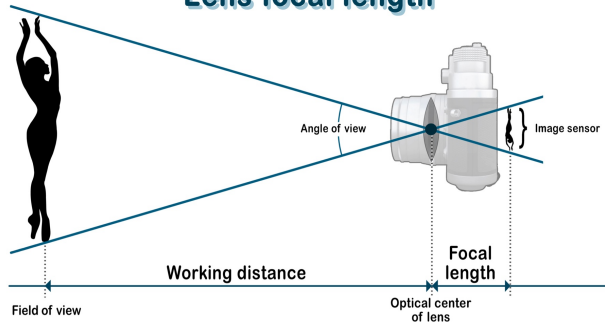
Name Tag:

Hi my name is 192.168 ...



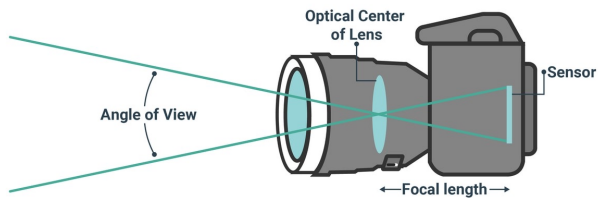
Lens focal length

CameraHarmony



<https://cameraharmony.com/focal-length-explained/>

WHAT IS FOCAL LENGTH IN PHOTOGRAPHY?



<https://capturetheatlas.com/what-is-focal-length/>

Focal Length is the distance between the optical center of a lens and the camera image sensor

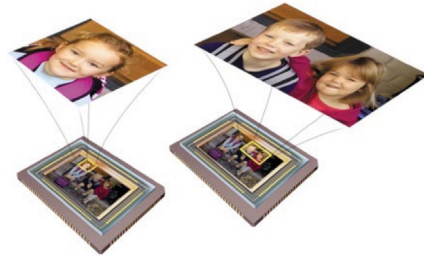
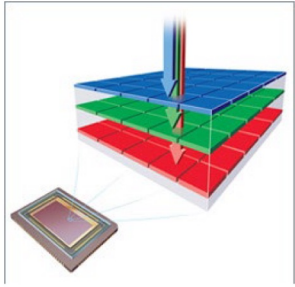
Focal length works describing each lens in terms of millimeters (lens mm)

The longer the focal length, the physically longer the lens will be



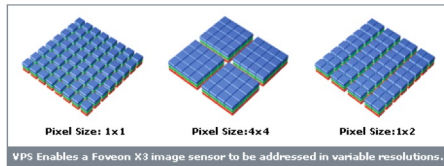
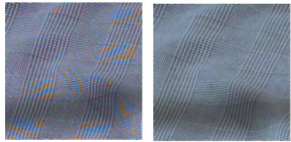
Color CMOS sensor

Foveon's X3



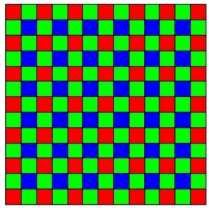
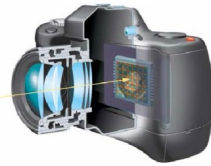
better image quality

smarter pixels



Filter mosaic

Coat filter directly on sensor



Color filter array (CFA)

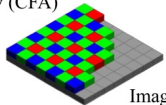
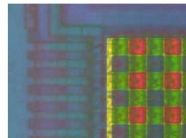


Image sensor



Bayer filter

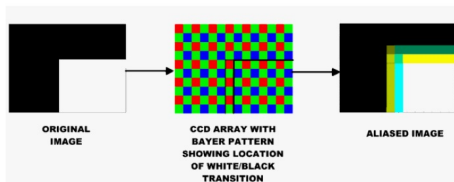
Demosaicing (obtain full color & full resolution image)

G	R	G	R
B	G	B	G
G	R	G	R
B	G	B	G

CFA

rGb	Rgb	rGb	Rgb
rgB	rGb	rgB	rGb
rGb	Rgb	rGb	Rgb
rgB	rGb	rgB	rGb

Interpolated
(lower case)
pixel values



Introduction to Computer Vision I