

# Traditional Network vs. Cloud Infrastructure

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# Connecting Traditional Networks with Modern Cloud Infrastructure

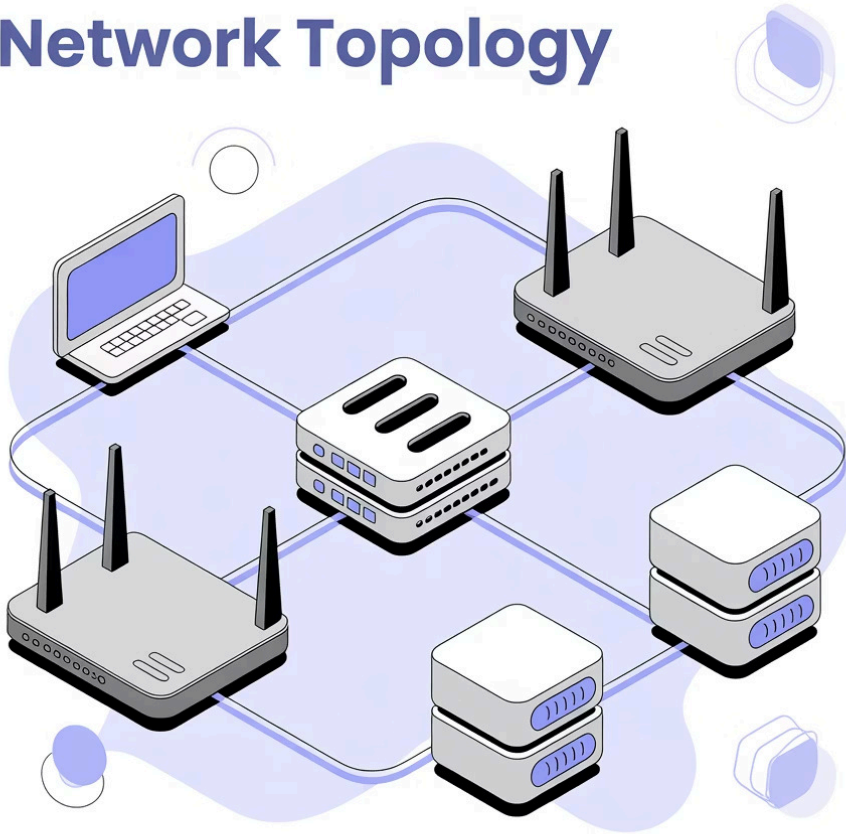
Illustrating multi-layered enterprise networks and their cloud counterparts

## Enterprise Network Diagram



# Topology Overview

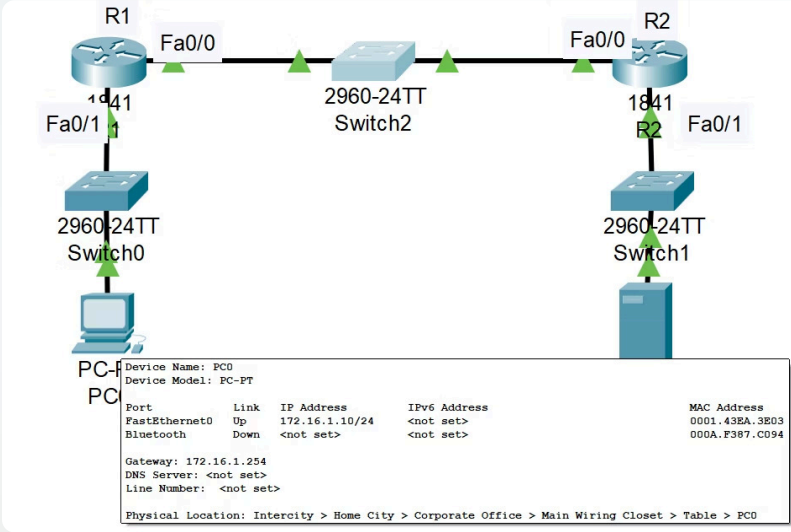
## Network Topology



- Traditional network with:
- 2 Routers (R1, R2)
- 3 Switches
- 1 Client PC (PC0)
- 1 Web Server
- IP Configuration:
- PC0: 172.16.1.10
- Server: 172.17.1.20
- R1: 172.16.1.254 / 10.0.1.1
- R2: 172.17.1.254 / 10.0.1.2

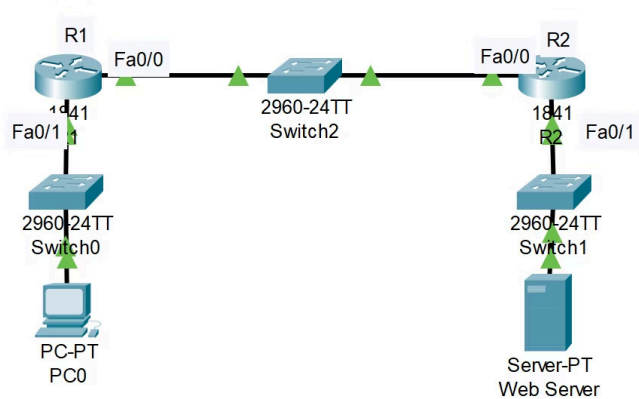
# Network Topology Diagram

Visual representation of the network topology showing the connections between all devices (PC0 details)



# Device Roles

Device	Role
PC0	Client Machine
Server	Web Service Host
R1	Gateway for PC0
R2	Gateway for Server
Switches	Layer 2 Data Forwarding



# Network Device Configuration

Screenshot showing the configuration details of the network devices in the topology

# Packet Journey - Step-by-Step

## Initial Check

PC0 checks if server IP is in same subnet (No)

## Gateway Discovery

ARP request to R1 for MAC of gateway (172.16.1.254)

## Gateway Response

R1 replies with MAC 0002.1D6D6.A602

## Router Forwarding

Packet routed from R1 to R2

## Server Discovery

R2 performs ARP for server

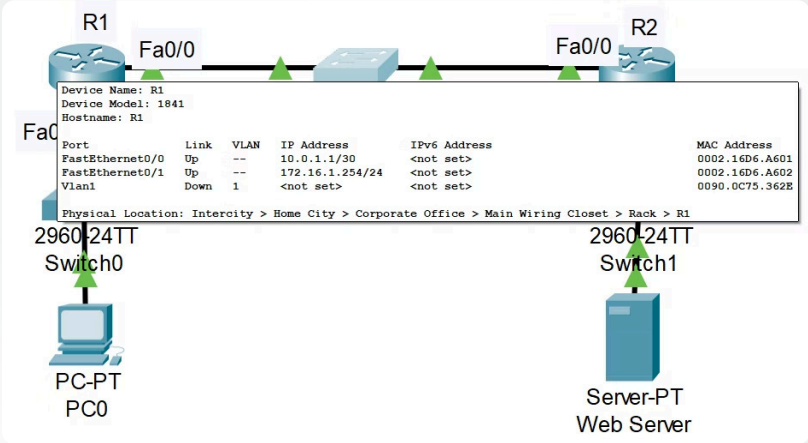
## Final Delivery

Server replies with MAC 0006.2A17.C0D6

Packet delivered

# Packet Flow Visualization

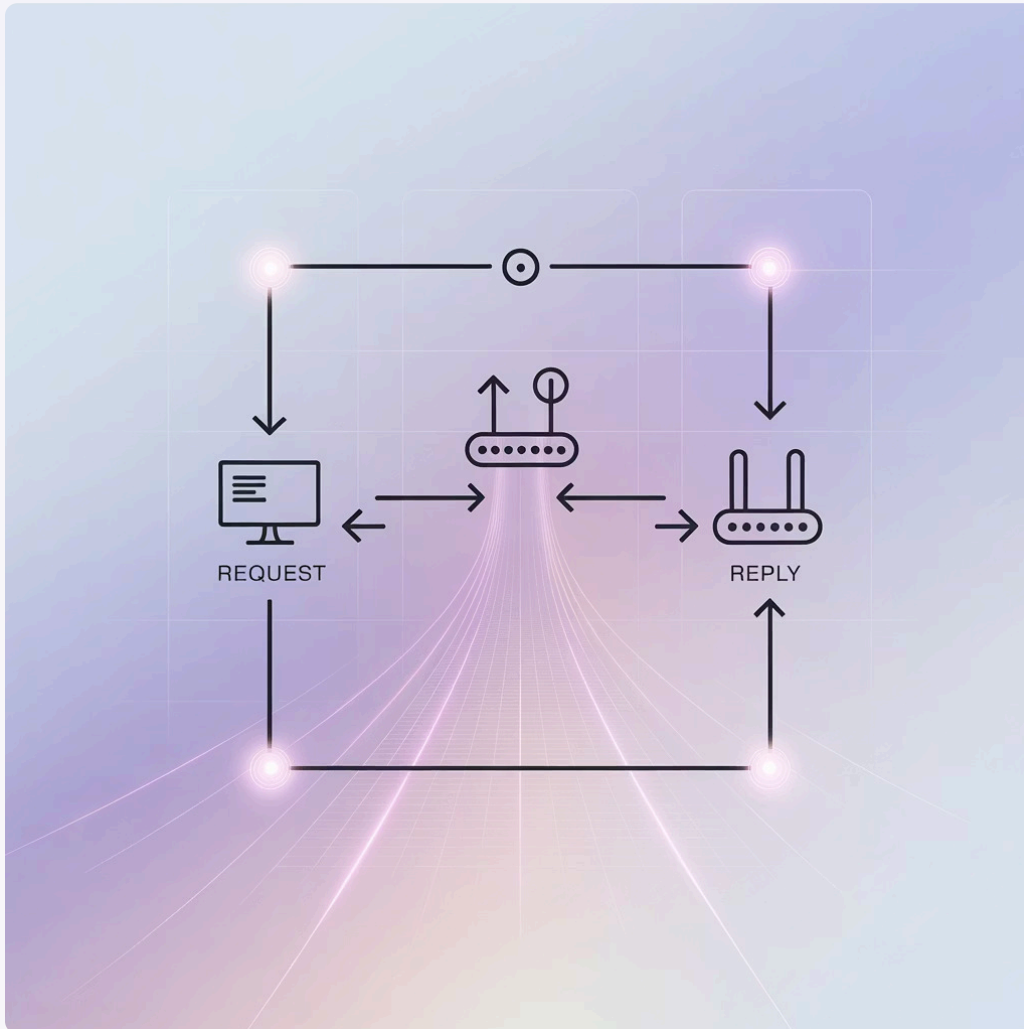
Detailed visualization of the packet flow through the network topology(R1)





# ARP and Layer 2 Behavior

- ARP (Address Resolution Protocol): resolves IP to MAC
- PC uses R1's MAC to send frames
- Routers forward Layer 3 packets, updating Layer 2 addresses at each hop



# ARP Process Visualization

Screenshot showing the ARP process in action within the network (R2)

Fa0/0

R2

18

2960-24TT

Device Name: R2

Device Model: 1841

Hostname: R2

Port	Link	VLAN	IP Address	IPv6 Address	MAC Address
FastEthernet0/0	Up	--	10.0.1.2/30	<not set>	0001.C972.4201
FastEthernet0/1	Up	--	172.17.1.254/24	<not set>	0001.C972.4202
Vlan1	Down	1	<not set>	<not set>	0001.9756.6278

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > R2

# Cloud Equivalents

Feature	Traditional	Cloud
Router	R1/R2	Virtual Routers (VPC Tables)
Switch	Physical 2960	ENIs and Subnets
ARP	Manual	Cloud abstracts it
IP Addressing	Manual/DHCP	Elastic IPs or Private IPs

# Mathematical Models - BDP

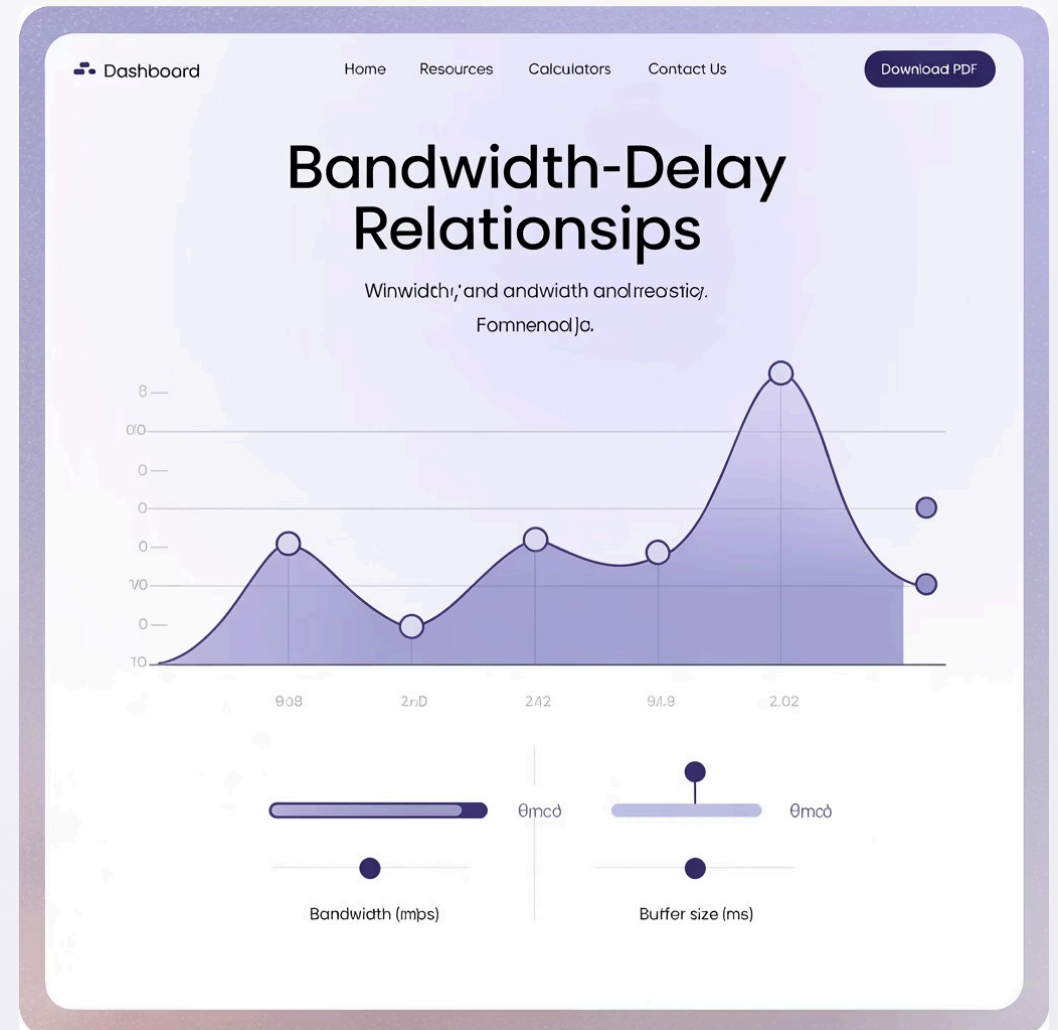
## Bandwidth-Delay Product (BDP)

$$BDP = Bandwidth \times RTT$$

Example:

- Bandwidth = 100 Mbps
- RTT = 0.05 s

$$BDP = 100e6 \times 0.05 = 5e6 \text{ bits} = 625 \text{ KB}$$



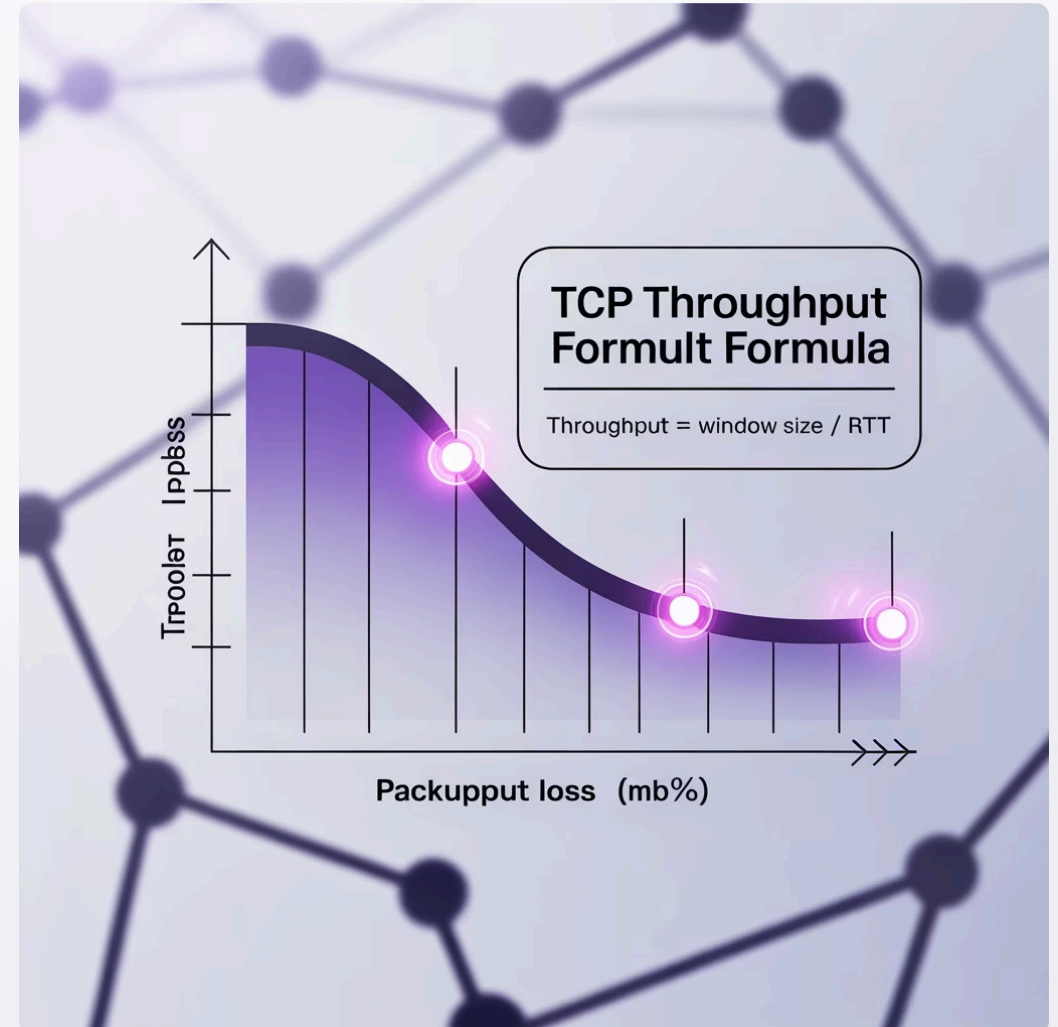
# TCP Throughput Formula

$$Throughput = \frac{MSS}{RTT} \times \sqrt{\frac{3}{2p}}$$

Where:

- MSS = Max Segment Size
- RTT = Round Trip Time
- p = packet loss rate

Insight: Loss increases, throughput decreases



# Queuing Delay

$$D_{queue} = \frac{L \times N}{R}$$

Where:

- L = packet size (bits)
- N = packets in queue
- R = link bandwidth (bps)

Application: Switch-level queuing and congestion detection



# Troubleshooting Benefits



## Layer Identification

Identify delay at L2 or L3



## ARP Debugging

Debug ARP issues



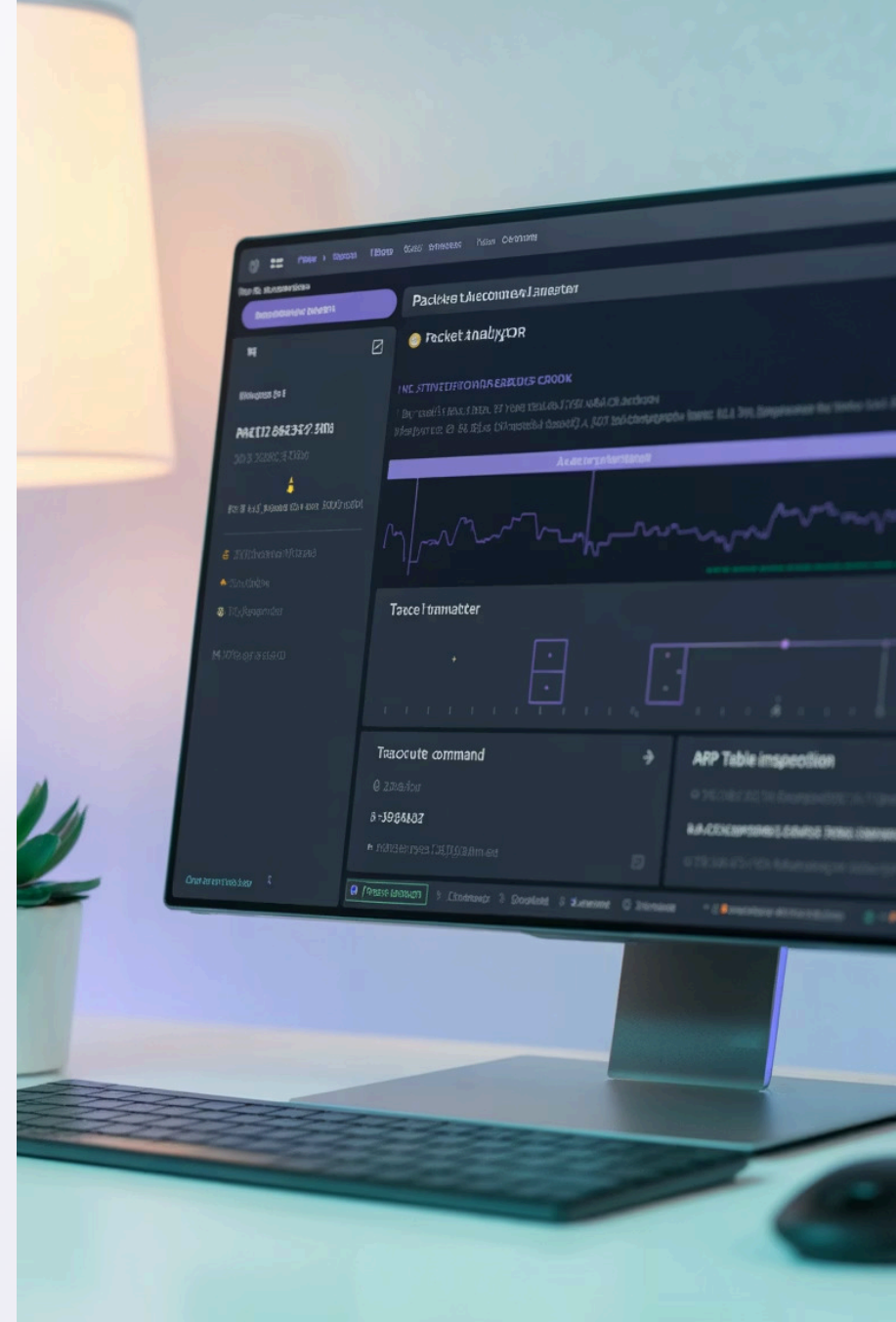
## Path Tracing

Trace route paths (traceroute)



## Configuration Validation

Detect subnet misconfiguration





# Cloud Migration Relevance



## Gateway Mapping

Traditional gateways map to cloud routing tables



## Protocol Abstraction

ARP maps to ENI resolution



## Security Translation

ACLs map to Security Groups & NACLs



## Knowledge Transfer

Easier to troubleshoot with foundational network knowledge

# Enterprise Cloud Migration Solutions

Accelerate your journey to the cloud with our enterprise-grade migration expertise



### Advanced Security

Comprehensive protection  
for your cloud environment



### Cost Optimization

Identify and eliminate  
unnecessary costs



### Infinite Scalability

Scale your infrastructure  
to meet demand



# Security and Optimization



- ACLs and VLANs → Security Groups
- Subnet segmentation for Zero Trust
- Buffer & RTT tuning for cloud throughput
- Cloud autoscaling compared to physical capacity planning

# Summary Table

Concept	Traditional	Cloud
Layer 2	Switches	ENIs
Layer 3	Routers	VPC Routing Tables
IP Address	Static/DHCP	Private/Elastic IPs
ARP	Required	Abstracted
Security	ACLs, NAT	SGs, NACLs