HO CHI MINH CITY UNIVERSITY OF SCIENCE
FACULTY OF ELECTRONICS AND TELECOMMUNICATIONS
DEPARTMENT OF TELECOMMUNICATIONS AND NETWORKS

COURSE

# COMPUTER NETWORKS

Chapter 06

# UDP TRANSPORT

Reference: Peter L Dordal, "An Introduction to Computer Networks," Feb 05, 2022

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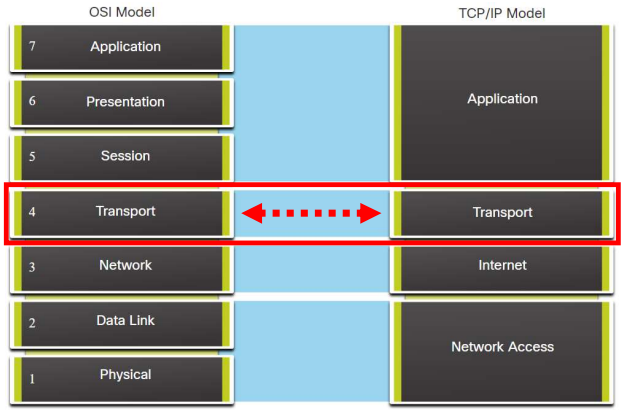
1 User Datagram Protocol

## 1. User Datagram Protocol – UDP

- The Layer 4 data stream is a **logical connection** between the endpoints of a network.
- It provides transport services from a host to a destination.
- This service is sometimes referred to as an end-to-end service.

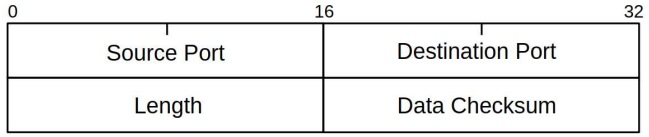



- Provides two protocols:
  - TCP – Transmission Control Protocol
  - UDP – User Datagram Protocol



## 1. User Datagram Protocol – UDP

- UDP provides simple datagram delivery to remote sockets (<host,port> pairs).
  - UDP as "almost a null protocol".
- The two features it adds beyond the IP layer are port numbers and a checksum. UDP Header:




- **Port number:**
  - An application can now connect to an individual server ***process***, rather than simply to a host.

## 1. User Datagram Protocol – UDP

❖**Well-Known Ports:**

➢Reserved for common services and applications.

| Port Number Range | Port Group |
|---|---|
| **0 to 1023** | **Well Known (contact) ports** |
| 1024 to 49151 | Registered Port |
| 49152 to 65535 | Private and/or Dynamic Ports |

**Example Applications:**

- Domain Name System (DNS - 53)
- Voice over IP (VoIP - 5060)
- Dynamic Host Configuration Protocol (DHCP – 67, 68)
- Trivial File Transfer Protocol (TFTP - 69)



## 1. User Datagram Protocol – UDP

❖**Registered Ports:**

➢Optional user processes and applications.

➢A user has chosen to install rather than common applications that would receive a Well Known Port.

| Port Number Range | Port Group |
|---|---|
| 0 to 1023 | Well Known (contact) ports |
| **1024 to 49151** | **Registered Port** |
| 49152 to 65535 | Private and/or Dynamic Ports |

**Example Applications:**

- Voice over IP (VoIP - 5060)
- Online Games (PlayStation®4 - 3478, 3479)



## 1. User Datagram Protocol – UDP

❖**Dynamic Ports:**

➢Assigned to a user application at connect time.

➢It is not very common for a client to connect to a service using a Dynamic or Private Port.

| Port Number Range | Port Group |
|---|---|
| 0 to 1023 | Well Known (contact) ports |
| 1024 to 49151 | Registered Port |
| **49152 to 65535** | **Private and/or Dynamic Ports** |



## 1. User Datagram Protocol – UDP

❖UDP is known as a **best-effort delivery protocol**.

➢UDP is **unreliable**, in that there is no UDP-layer attempt at *timeouts*, *acknowledgment* and *retransmission*.

➢UDP is **unconnected** (or **stateless**)

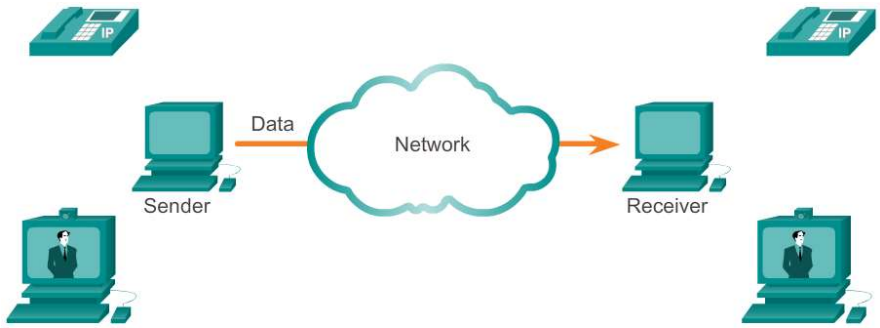
- Deliver packets without *negotiation*.
- No acknowledgement

❖The **UDP checksum** covers the UDP header, the UDP data and also the source and destination IP addresses.

❖Using in "local" transport or real-time transport.

## 1. User Datagram Protocol – UDP

### ❖Low Overhead




**UDP does not establish a connection before sending data.**

UDP provides low overhead data transport because it has a small datagram header and no network management traffic.

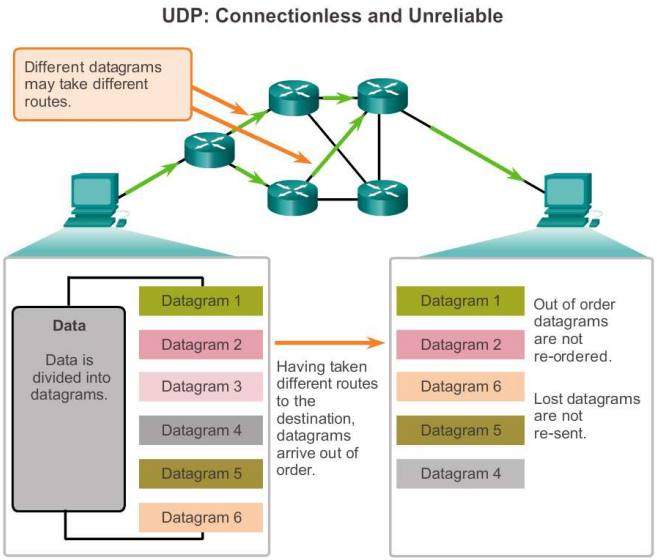


## 1. User Datagram Protocol – UDP

### ❖Datagram Reassembly

➢If datagrams take multiple paths, they will sometimes arrive in the wrong order.

➢UDP does not sequence the datagrams as TCP does nor are there any acks.




❖ Re-sequencing datagrams and handling missing data is up to the application.

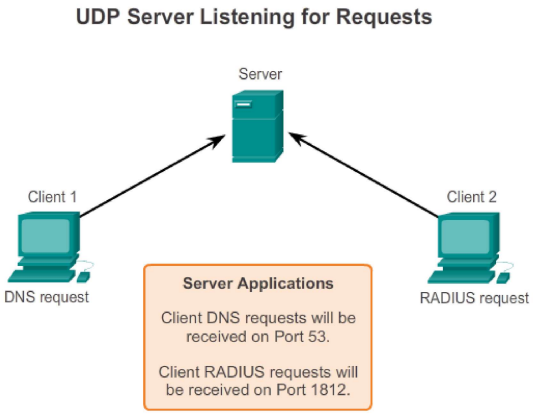


## 1. User Datagram Protocol – UDP

### ❖UDP Server Processes and Requests

➢UDP-based server applications are assigned **well-known or registered** port numbers.

➢UDP client process randomly selects port number from range of **dynamic port** numbers as the source port.

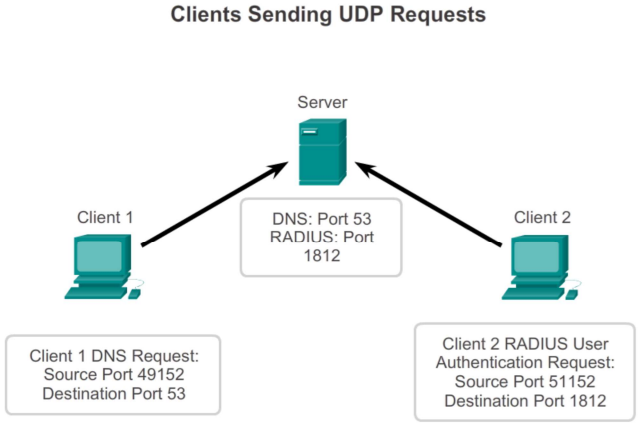



Client requests to servers have well known port numbers as the destination port.



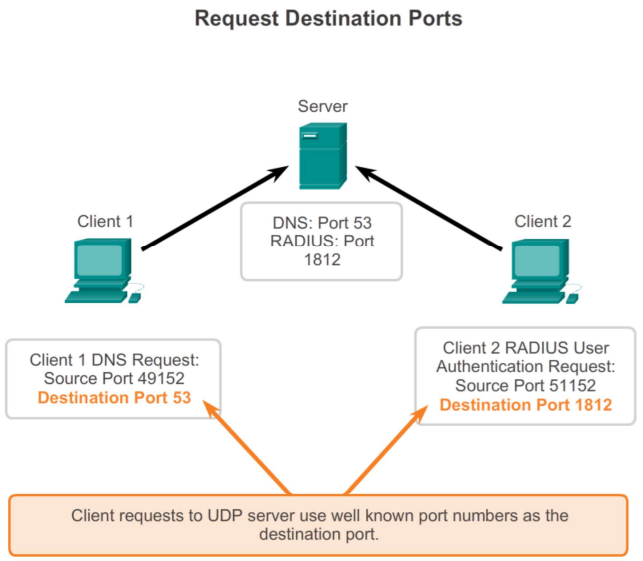
## 1. User Datagram Protocol – UDP

### ❖UDP Client Processes



# 1. User Datagram Protocol – UDP

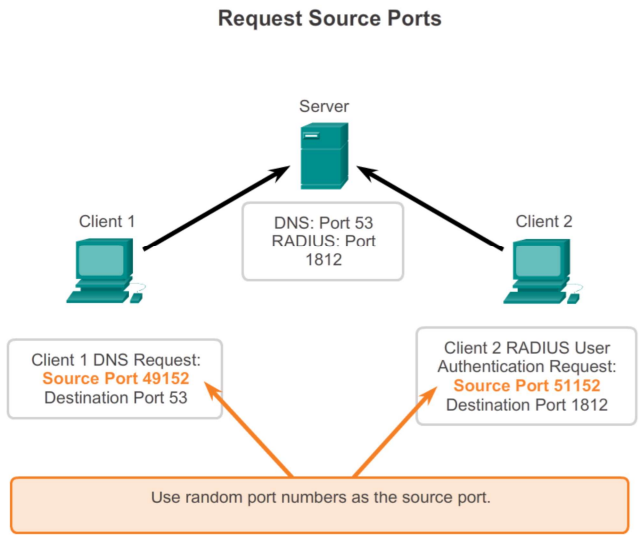
## ❖UDP Client Processes






# 1. User Datagram Protocol – UDP

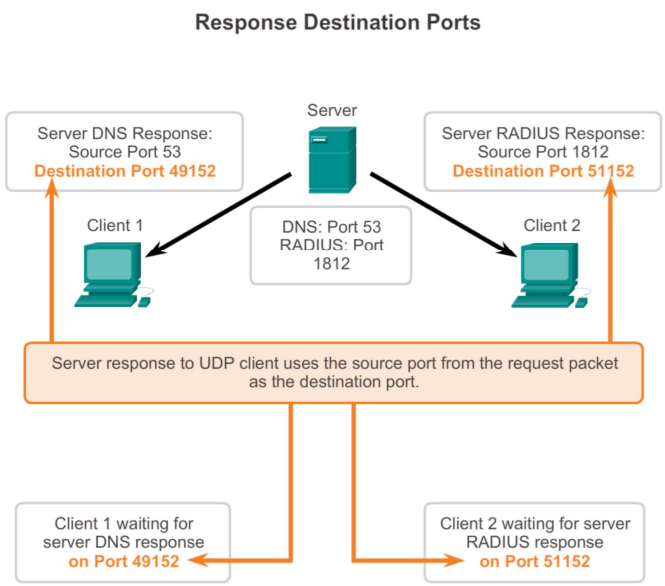
## ❖UDP Client Processes






# 1. User Datagram Protocol – UDP

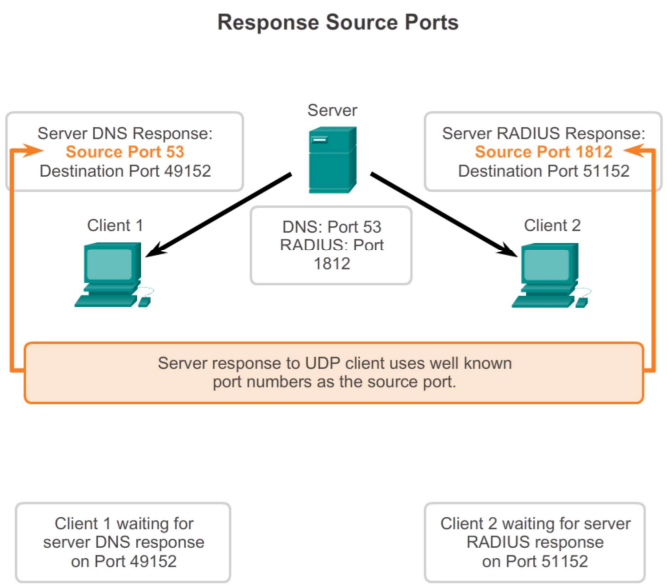
## ❖UDP Client Processes






# 1. User Datagram Protocol – UDP

## ❖UDP Client Processes



## 1. User Datagram Protocol – UDP

- Sometimes UDP is used simply because it allows new or experimental protocols to run entirely as user-space applications; no kernel updates are required.

- **QUIC**:
  - From Google
  - Support the HTTP protocol.
  - Supporting multiplexed streams in a single connection.
    - A lost packet blocks its own stream until it is retransmitted, but the other streams can continue without waiting.



## QA

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