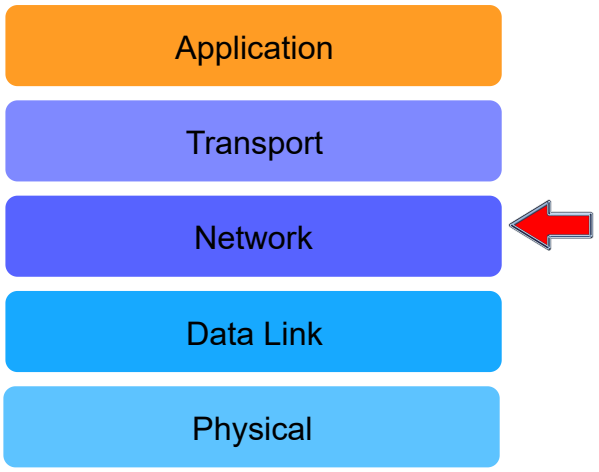
What Is the Network Layer?

In this lesson, we'll get a quick introduction to the network layer.

We'll cover the following

You Are Here!

Let's zoom out and have a look at the big picture.



Main Objectives & Key Responsibilities

The main objective of the network layer is to allow end systems to exchange information through intermediate systems called **routers**. The unit of information in the network layer is called a **packet**.

Limitations Of The Underlying Data Link Layer

Messages at the data link layer are called **frames**. There are more than a

dozen different types of data link layers.

1. Every data link layer technology has a limit on maximum frame size.
2. Most of them use a different maximum frame size.
3. Furthermore, each interface on an end system in the data link layer has a link layer address. This means the link layer has to have an addressing system of its own.

The network layer must cope with this heterogeneity of the data link layer.

Principles of the Network Layer

The network layer relies on the following principles:

1. Each network layer entity is identified by a **network layer address**. This address is independent of the data link layer addresses that the entity may use.

2. The service provided by the network layer **does not depend on** the service or the internal organization of **the underlying data link layers**. This independence ensures:

    - **Adaptability**. The network layer can be used by hosts attached to different types of data link layers.
    - **Independent Evolution**. The data link layers and the network layer evolve independently from each other.
    - **Forward Compatibility**. The network layer can be easily adapted to new data link layers when a new type is invented.

3. The network layer is conceptually divided into **two planes**:

    1. The **data plane**. The data plane contains the protocols and mechanisms that allow *hosts and routers to exchange packets carrying user data*.
    2. The **control plane**. The control plane contains the protocols and mechanisms that *enable routers to efficiently learn how to forward packets towards their final destination*.

Network Layer Services

There are two types of services that can be provided by the network layer:

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- An unreliable connectionless service. This kind of service does not ensure message delivery and involves no established connections.
- A connection-oriented, reliable or unreliable, service. This kind of service establishes connections and may or may not ensure that messages are delivered.

Nowadays, most networks use an unreliable connectionless service at the network layer. This is our main focus in this chapter.

Quick Quiz!

1 What is the unit of information in the network layer called?

A) A segment

B) A datagram

C) A packet

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In the next lesson, we'll look at the two most common ways that the network layer is organized.