

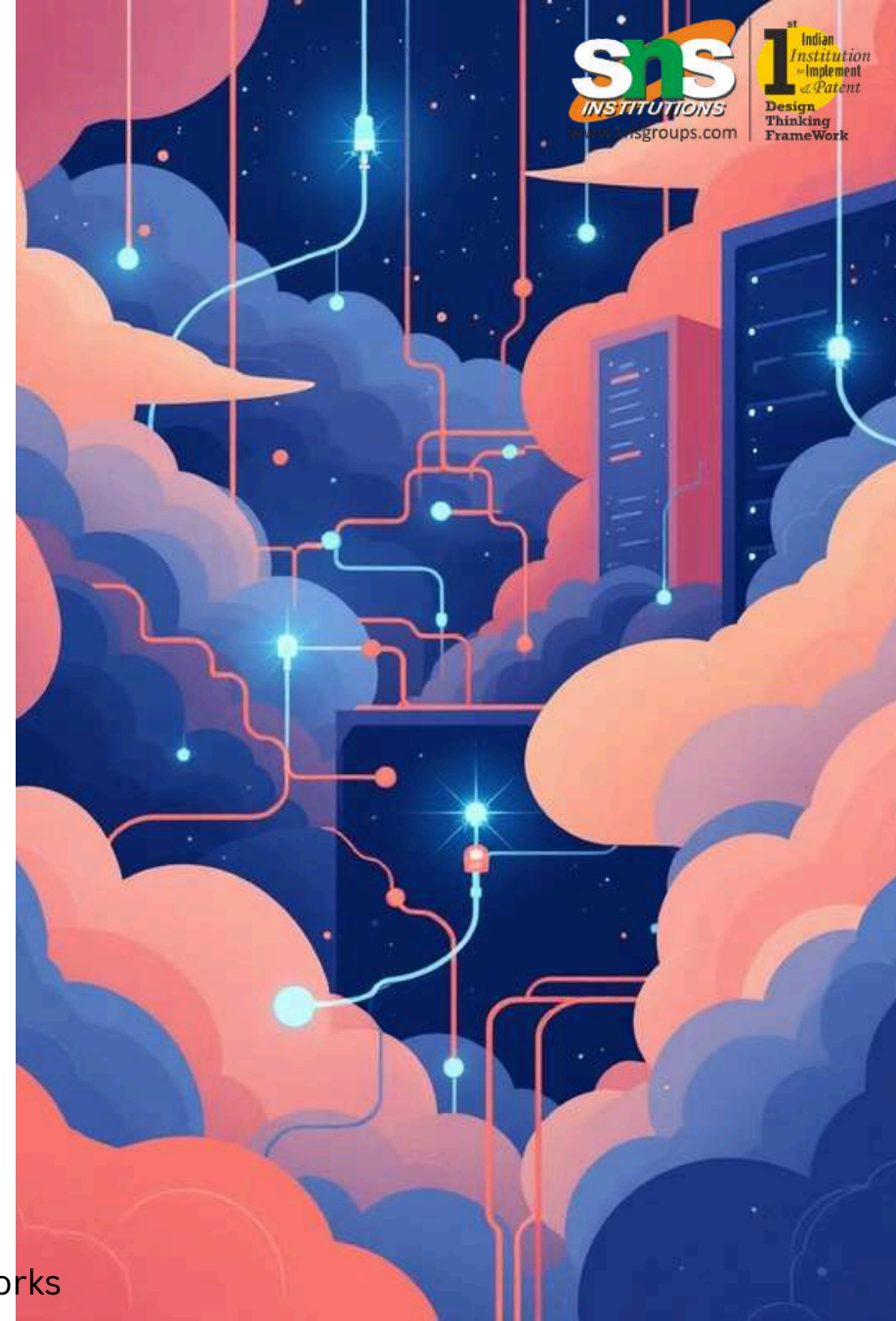
# 23ITT204 - COMPUTER NETWORK

## UNIT 3 - NETWORK LAYER

### INTERNET PROTOCOL

# Internet Protocol in the Network Layer

Exploring the backbone of internet communication and how data travels across the globe



# What is the Network Layer and IP's Role?

The network layer, known as Layer 3 in the OSI model, is responsible for managing data delivery between different networks across the internet. Internet Protocol (IP) serves as the primary protocol at this layer, handling the critical tasks of addressing and routing packets across complex network infrastructures. IP breaks down data into manageable units called datagrams, each containing essential information including source and destination IP addresses. This packaging ensures that data can navigate through multiple networks to reach its intended destination.

## Addressing

Assigns unique identifiers to every device

## Routing

Determines optimal paths across networks

## Delivery

Ensures packets reach their destination

# Key Functions of Internet Protocol



## Logical Addressing

Assigns unique IP addresses using IPv4 (32-bit) or IPv6 (128-bit) formats to identify every device on the network, enabling global communication.



## Routing

Determines the most efficient path for packets to travel across multiple networks, using routing tables and algorithms to reach destinations.



## Fragmentation

Divides large packets into smaller fragments that fit network transmission limits, then reassembles them accurately at the destination point.

## Supporting Protocols

### ICMP - Internet Control Message Protocol

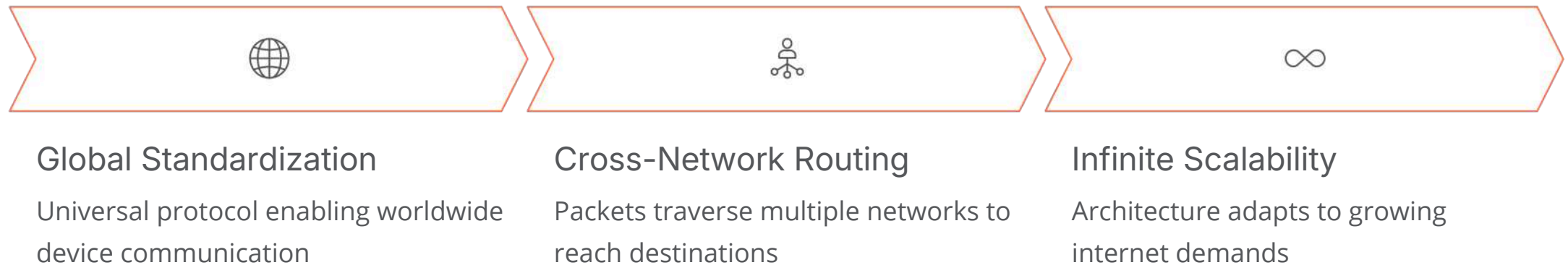
Reports network errors, diagnostics, and connectivity issues such as unreachable hosts or network timeouts.

### ARP - Address Resolution Protocol

Maps logical IP addresses to physical MAC addresses within local area networks for direct communication.

# Why IP Matters: The Internet's Universal Language

Internet Protocol serves as the fundamental standard that enables the internet's "network of networks" architecture, allowing billions of devices worldwide to communicate seamlessly regardless of their underlying hardware or network technology.



Without IP, devices couldn't locate or transmit data beyond their immediate local network, making the global internet impossible.

## IPv4: The Foundation

32-bit addressing system providing over 4 billion unique addresses, still widely deployed across existing infrastructure.

## IPv6: The Future

128-bit addressing offering virtually unlimited addresses (340 undecillion), solving the IPv4 exhaustion crisis.

IP's elegant design allows the internet to continuously scale, adapt, and evolve, powering everything from simple web browsing to high-bandwidth streaming, IoT devices, and sophisticated cloud computing platforms.