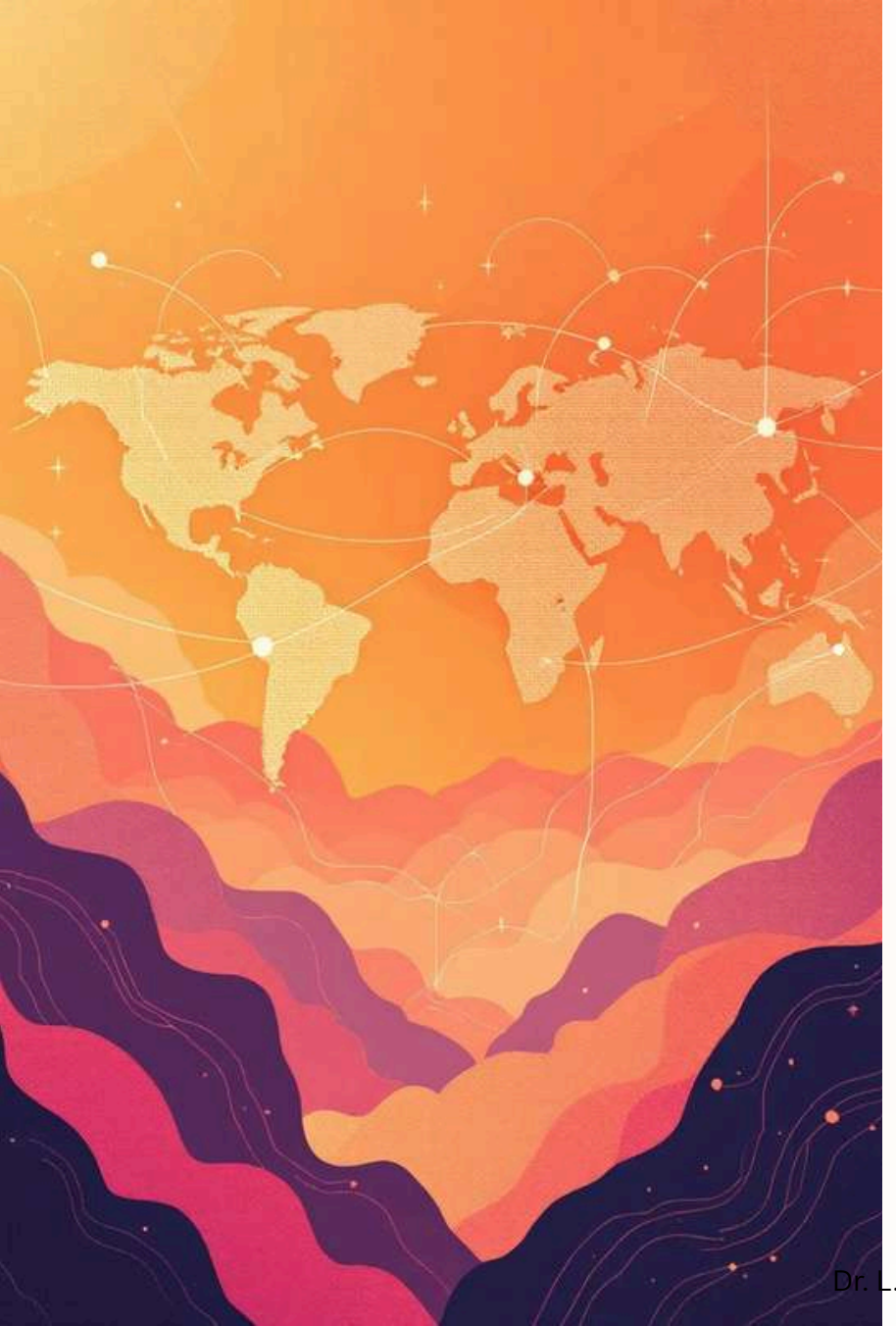
23ITT204 - COMPUTER NETWORK

UNIT 4 - ROUTING

BGP



Border Gateway Protocol (BGP) in Routing

The Internet's Interdomain Backbone

FOUNDATION

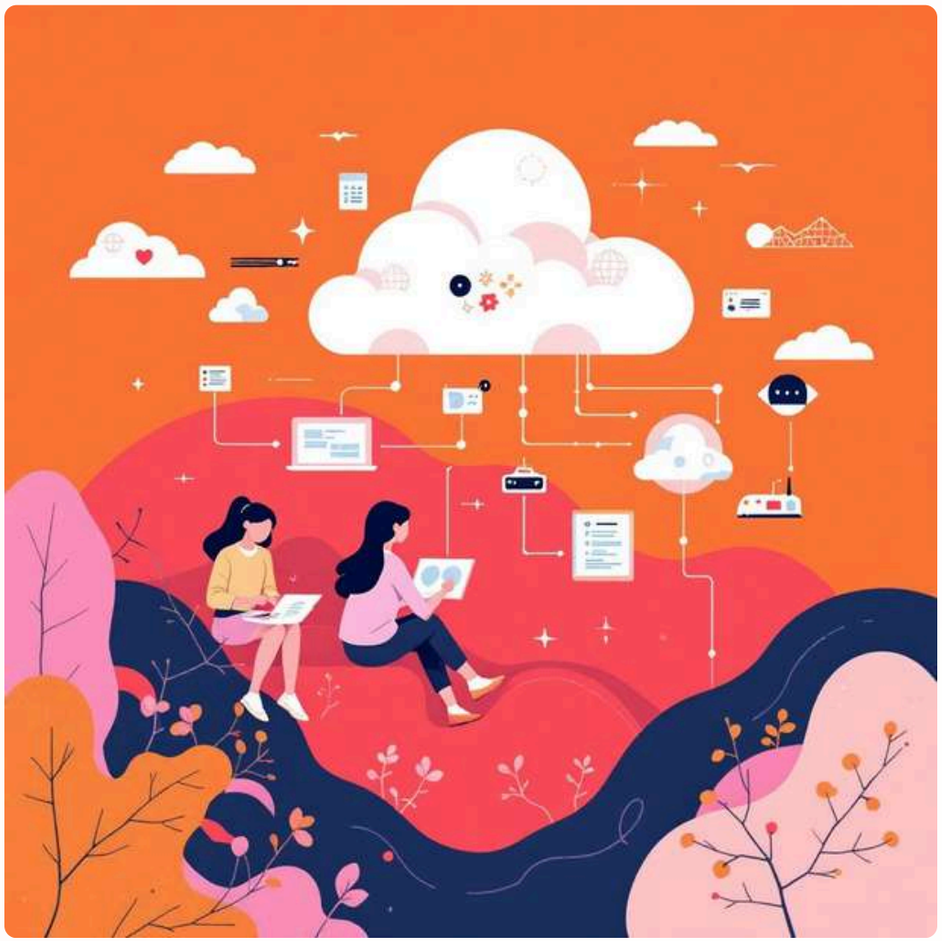
What is BGP and Why Does It Matter?

The Protocol

BGP is the primary exterior gateway protocol enabling routing between distinct Autonomous Systems (ASes) on the Internet. It ensures loop-free, policy-driven routing across thousands of networks operated by different organizations.
Unlike Interior Gateway Protocols (IGPs) like OSPF, BGP manages inter-AS routing, supporting the global Internet's scalability and reliability.

Technical Foundation

Uses TCP port for reliable exchange of routing information between peers.



MECHANICS

How BGP Works: Core Concepts & Mechanisms

01

Session Establishment

BGPpeers (routers)establish TCP sessions to exchange network reachability info, including IP prefixes and AS path lists.

02

Path-VectorProtocol

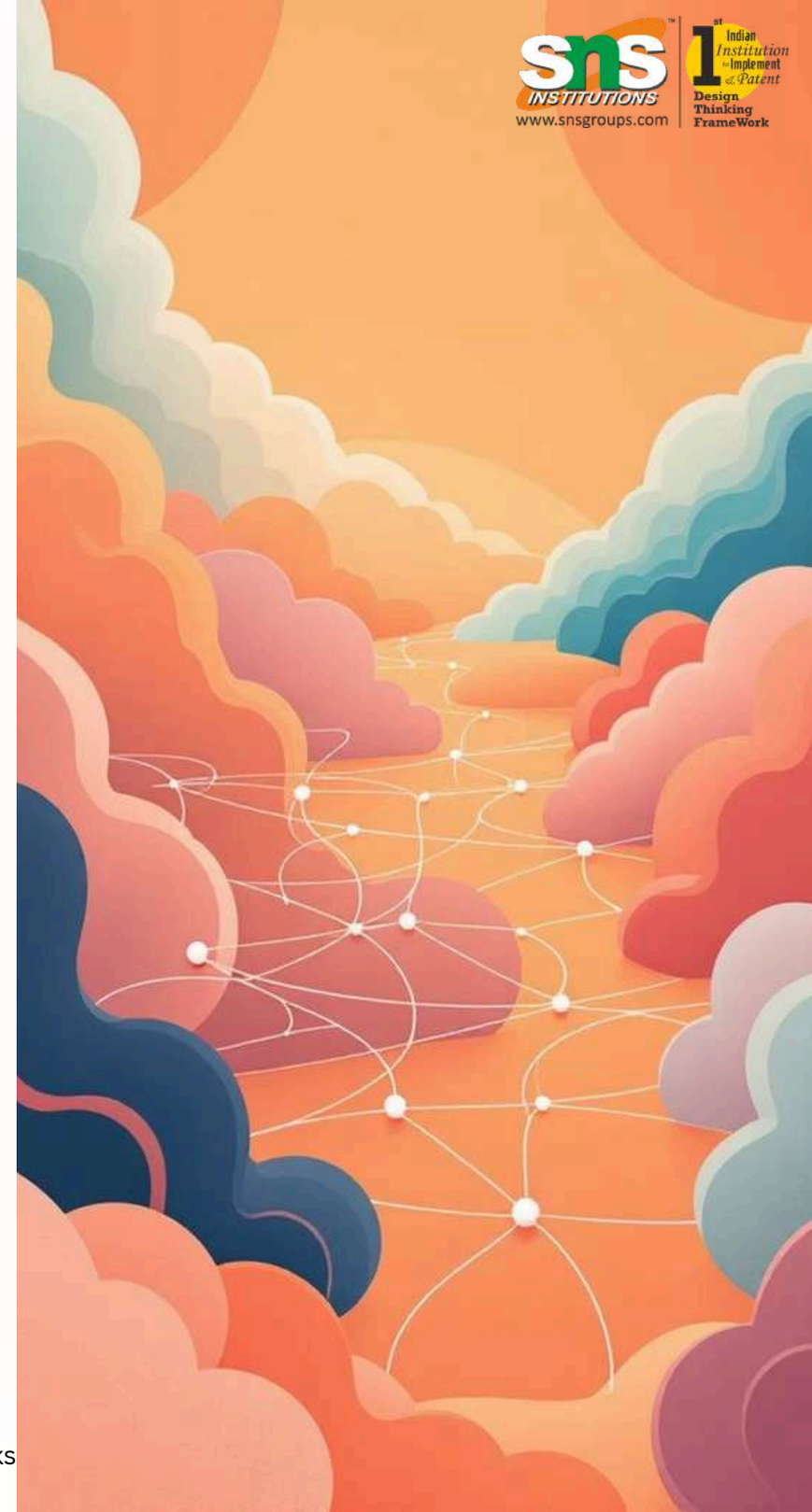
Routes carry ASpathattributes to prevent loops and enforce routing policies.

03

Route Optimization

Supports Class Inter-Domain Routing (CIDR) and route aggregation to reduce routing table size.

Key Message Types: OPEN (session setup), UPDATE (advertise/withdraw routes), KEEPALIVE (session maintenance), NOTIFICATION (error reporting).



IMPACT

Why BGP is Critical for the Internet

Global Connectivity

ConnectsISPs,enterprises,and data centers, enabling multi-homing and traffic engineering across the entire Internet infrastructure.

Policy Flexibility

Handles complex routingpolicies reflecting business relationships and traffic preferences between thousands of organizations.

Massive Scale

Scales totens of thousands of ASes, supporting the Internet's continuous growth and resilience across the globe.

Misconfigurations can cause widespread outages, highlighting the need for careful management. BGP remains the foundation of global Internet routing, evolving with multiprotocol extensions and IPv6 support.