

CS 31006: Computer Networks – Moving From End-to-End To Per Hop

**Department of Computer
Science and Engineering**



INDIAN INSTITUTE OF TECHNOLOGY
KHARAGPUR



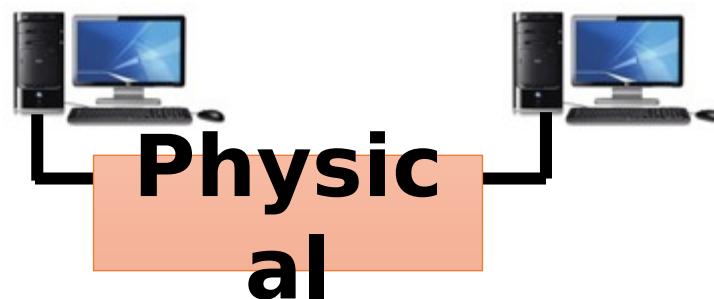
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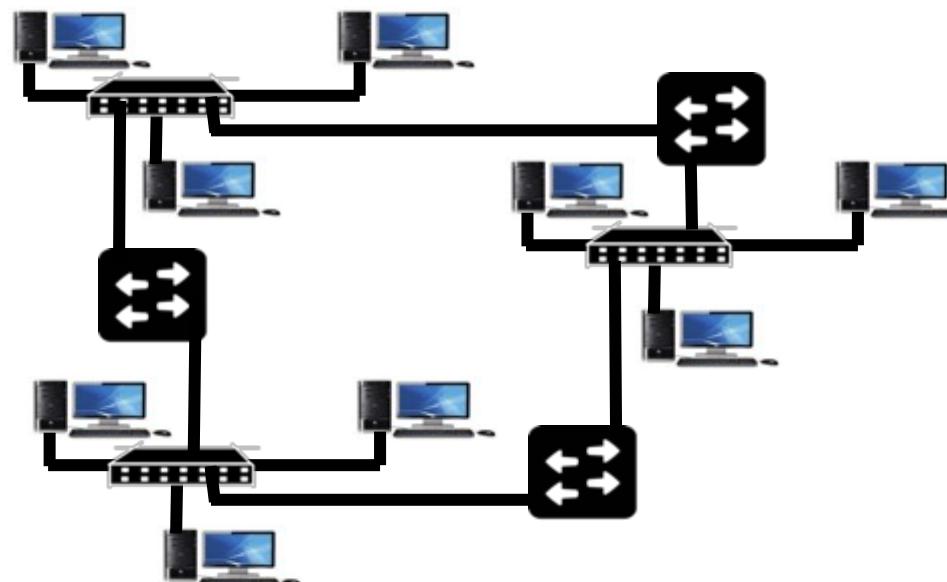


What We Have Learnt So Far ...

- The design of current network architecture is based on experience and requirements



Network
Data
Link
Physical



Data
Link
Physical

Transport
Network
Data
Link
Physical

What We Have Learnt So Far ...

Application

Transport

Network

Data Link

Physical

- **Protocol stack is implemented across different layers of the operating system**

Software, Kernel

Firmware,

Device Driver

Hardware

Network (Internet) Layer Services

End to end
packet
delivery

UDP

Connection
Establishm
ent

Reliable
Data
Delivery

Flow and
Congestion
Control

Ordered
Packet
Delivery

Transpor
t

TCP

Addressing

Datagram delivery (unreliable)

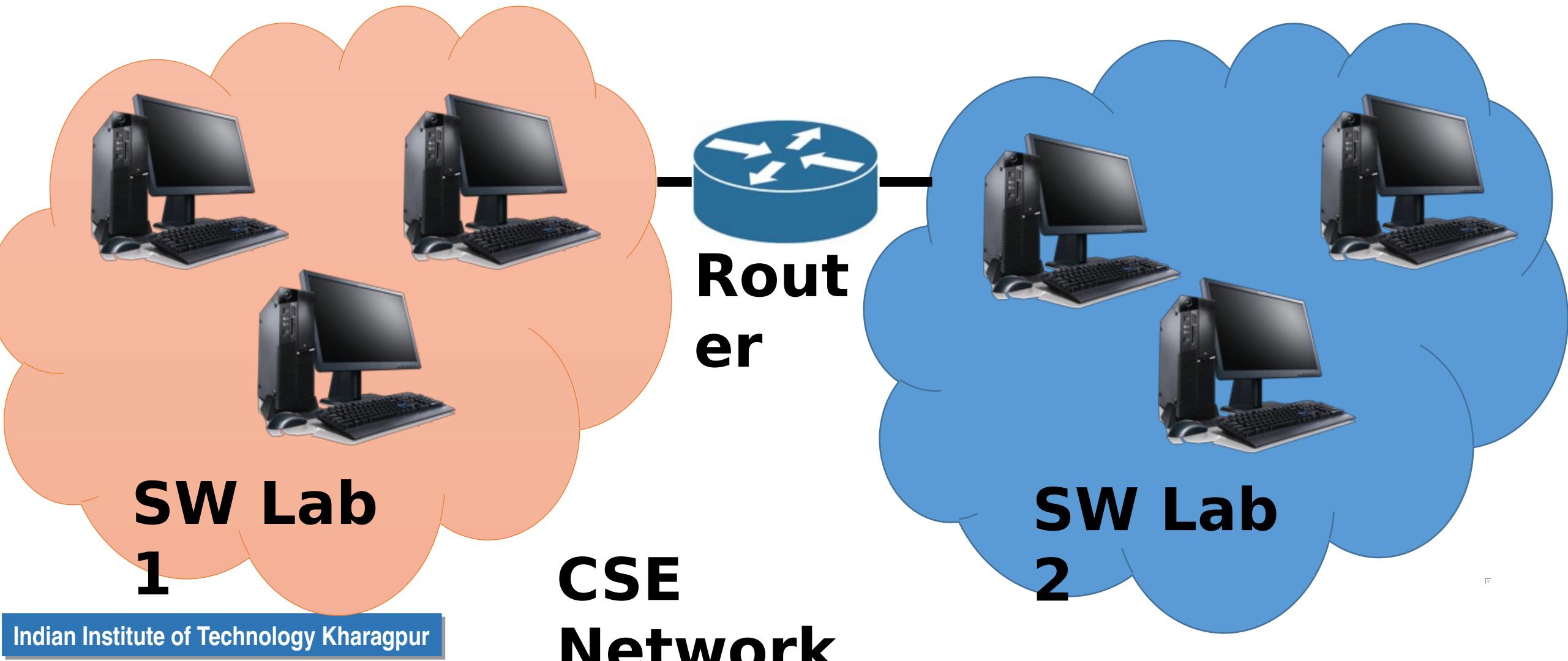
Routing

Network

Data Link

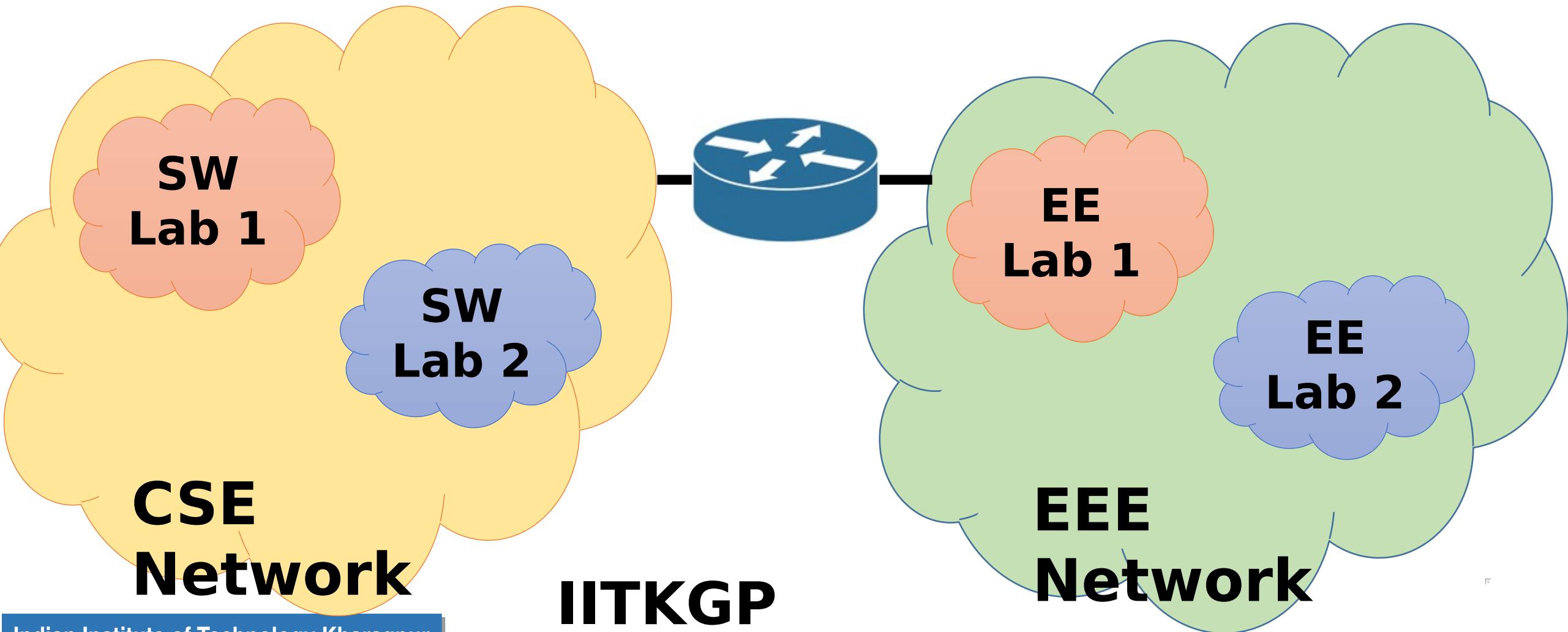
Internet Architecture - Basic Principles

- Internet is organized in a hierarchical fashion.



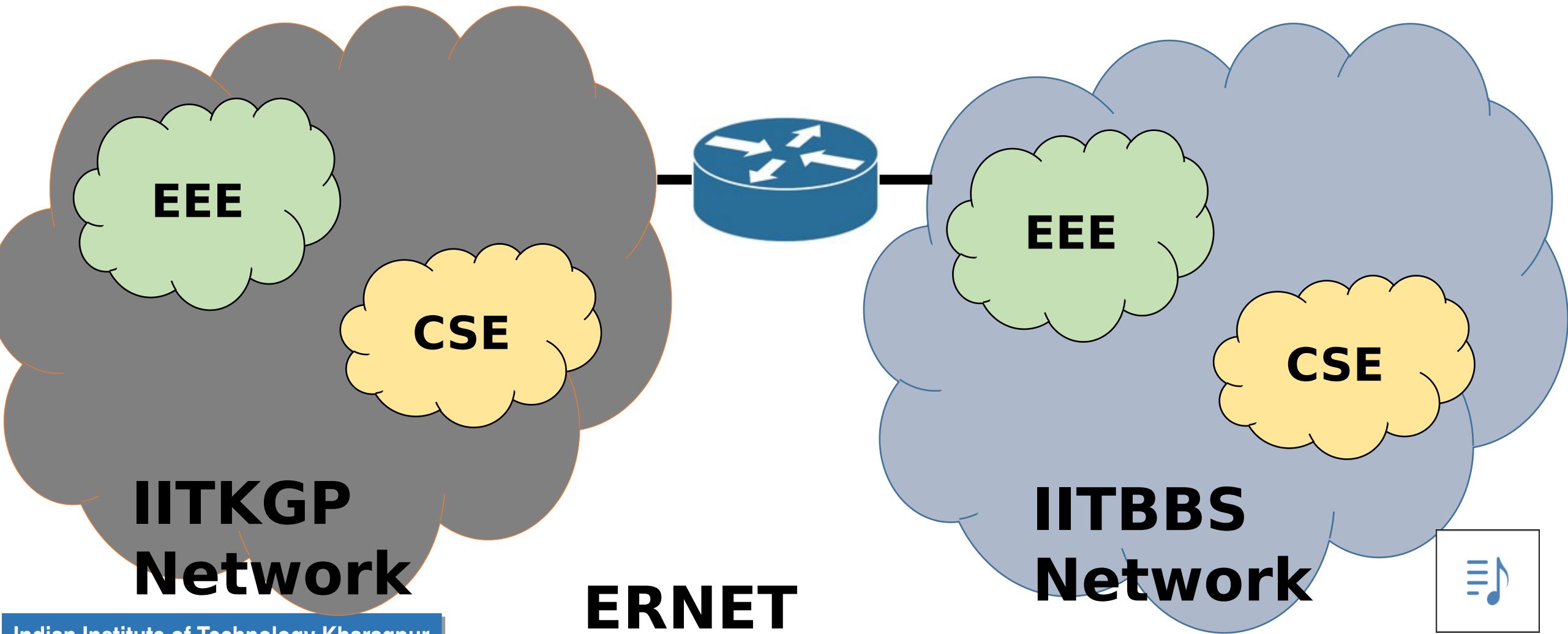
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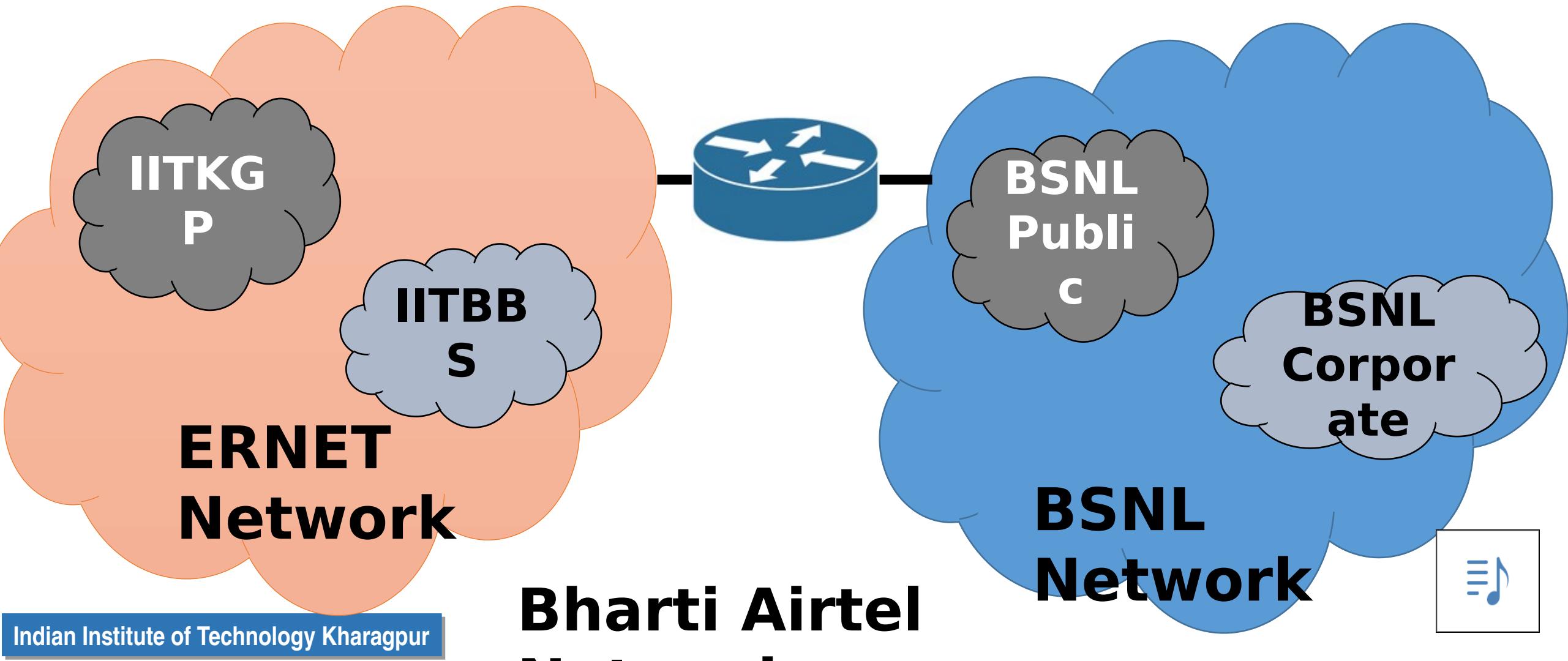
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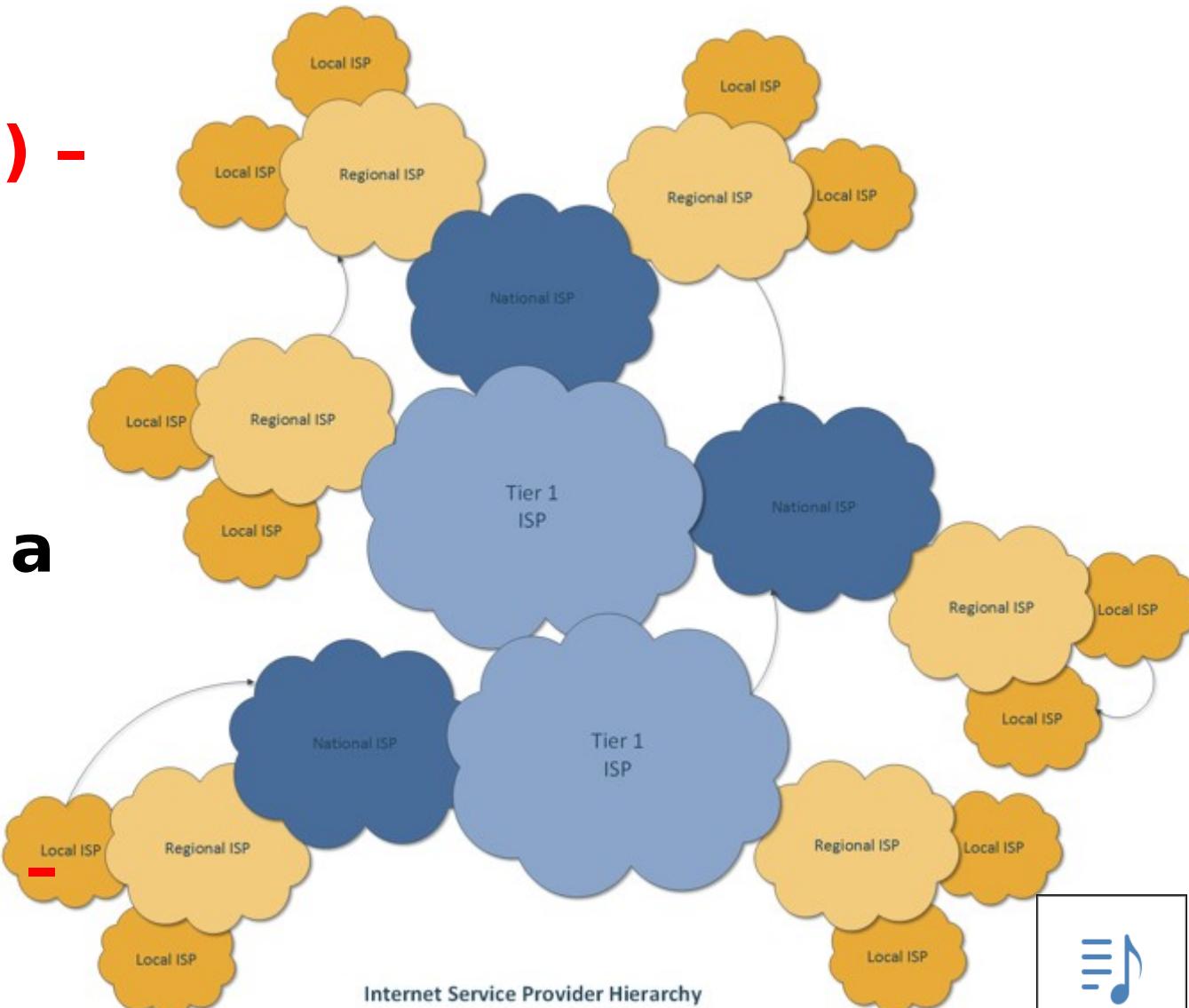


Autonomous Systems (AS) -

A set of LANs for an administrative domain, identified by a unique AS number, and the routing policies are controlled by a single administrator.

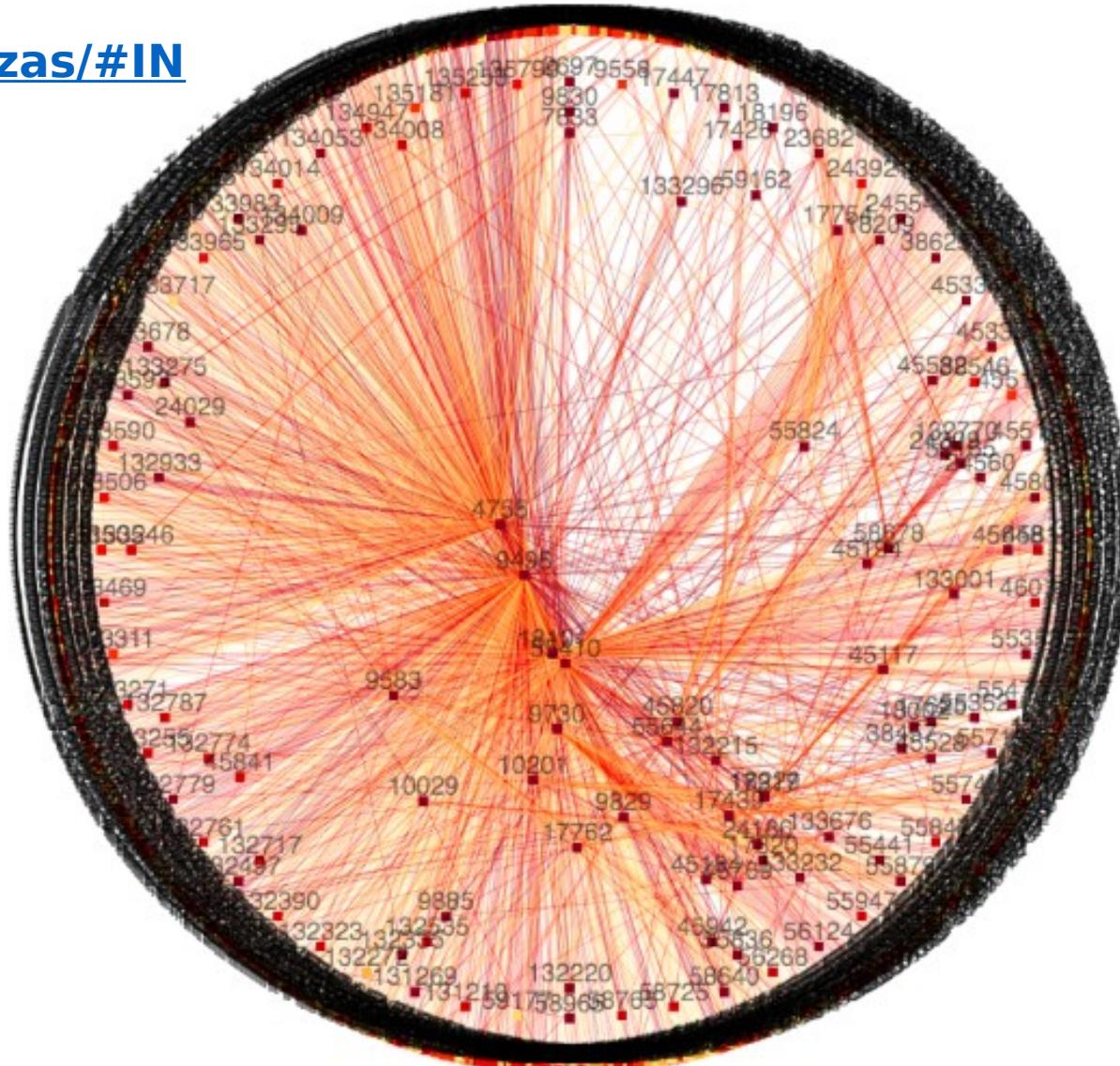
Local Area Network (LAN) -

A set of devices with a common layer 3 gateway



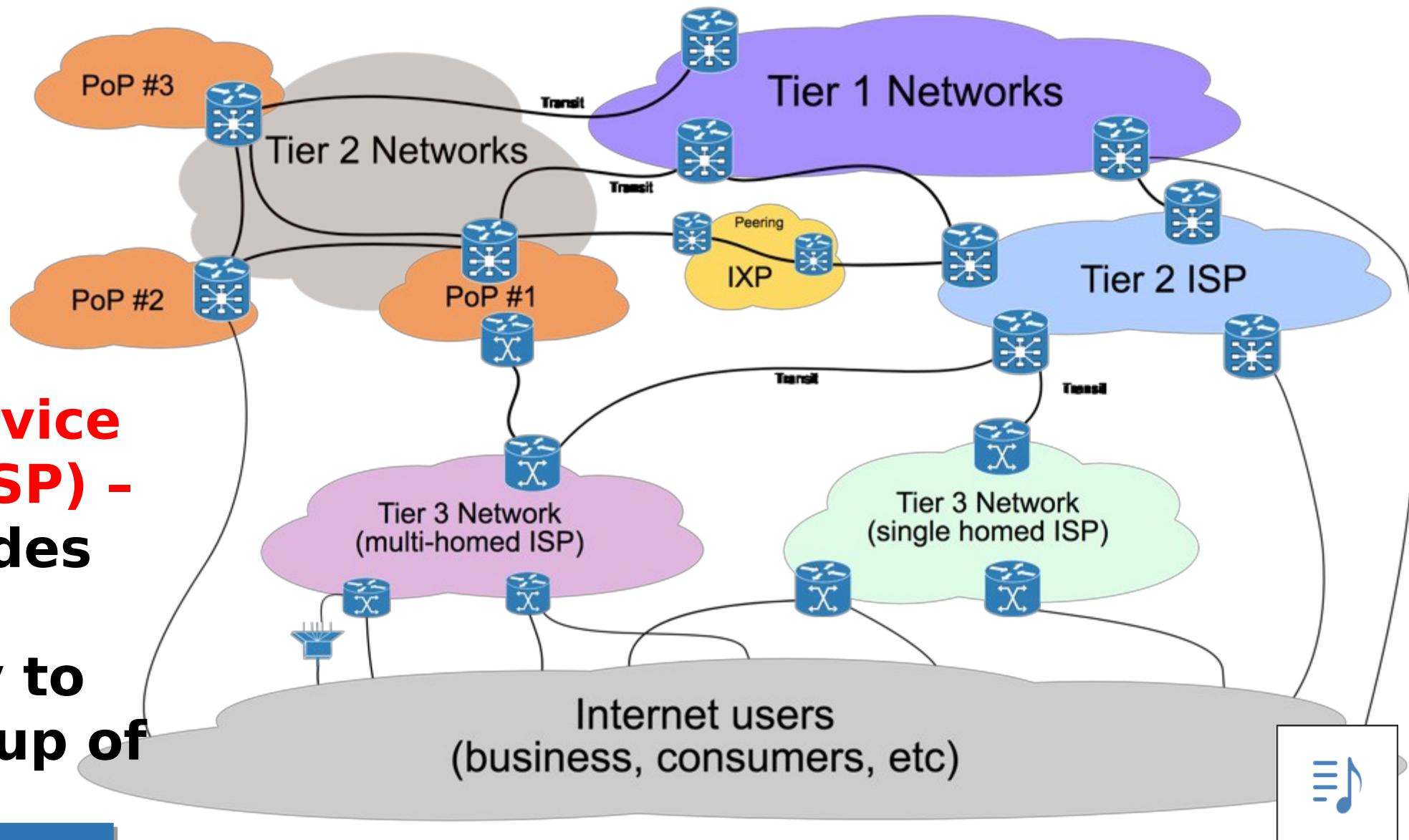
Autonomous System Graph for India

Source: <https://labs.apnic.net/vizas/#IN>

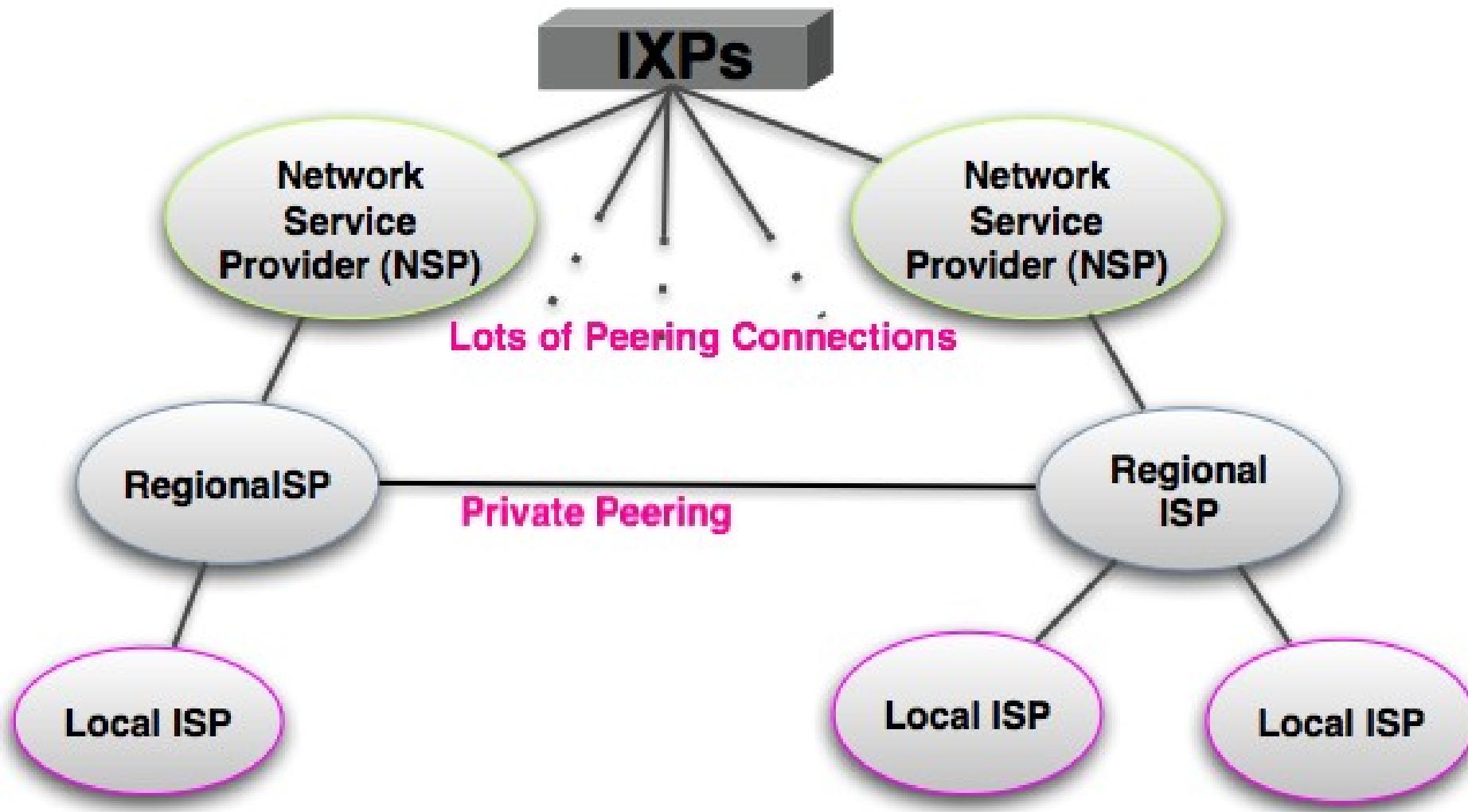


Internet Architecture

Internet Service Providers (ISP) -
An AS provides Internet connectivity to another group of ASes or end users



Peering between ISPs



Communication between Two Nodes over ISPs

