ISP Setup using Cisco, Juniper, MikroTik & OLT

🎓 Course Introduction

In today's digital era, providing reliable and high-speed internet service requires a well-structured and robust ISP (Internet Service Provider) network.
This comprehensive course is designed to train learners in building and managing a complete ISP setup using Cisco, Juniper, MikroTik, and OLT (FTTx) technologies.

Through this program, participants will gain hands-on experience in planning, configuring, monitoring, and troubleshooting ISP networks — from core to distribution to access levels.

It is one of the most complete and industry-oriented ISP setup courses in Bangladesh, covering all essential aspects of Routing, Switching, and FTTx-based access networks in a single learning path.

🎯 Course Objectives

The primary objective of this course is to develop the technical and practical skills required to plan, configure, operate, and maintain a complete ISP network infrastructure.

Specific objectives include:

- To understand the structure and operation of an ISP network
- To gain practical experience in multi-vendor environments using Cisco, Juniper, MikroTik, and OLT devices
- To master Routing, Switching, Firewall, VPN, VLAN, NAT, and Bandwidth Management concepts
- To learn how to deploy and manage FTTx (Fiber to the X) networks for access layer connectivity
- To develop expertise in NOC (Network Operation Center) management and fault resolution

- To prepare learners for careers as professional ISP and network engineers

🧑‍🎓 Target Audience

This course is ideal for:

- Individuals aspiring to work as Network Engineers in ISP, IIG, or NTTN organizations
- Professionals currently working with MikroTik or Cisco who want to expand into multi-vendor environments
- Network Technicians, Support Engineers, and NOC Engineers seeking advanced ISP knowledge
- University students who wish to specialize in networking and ISP infrastructure
- Entrepreneurs or IT professionals interested in starting or managing ISP businesses

🧠 Course Pre-requisites

No advanced programming knowledge is required for this course.
However, participants should ideally have:

- Basic understanding of networking concepts (LAN, IP Addressing, Subnetting)
- Familiarity with router and switch configuration
- Basic experience working on Windows or Linux systems
- A general idea about the Internet and network topologies

Module 1: Introduction to ISP & Network Infrastructure

- ISP কীভাবে কাজ করে
- NOC, POP ও IIG ধারণা
- Core–Distribution–Access আর্কিটেকচার
- IP Address Management (Public & Private)
- ASN এবং BGP Registration ধারণা
- Network Topology Planning
- Required Equipment Overview
- Safety & Standard Practices

Module 2: Networking Fundamentals

- OSI & TCP/IP Model
- LAN, MAN, WAN Concepts
- Collision & Broadcast Domains
- IPv4 & IPv6 Addressing
- Subnetting, Supernetting, VLSM
- Static & Dynamic IP Allocation
- Network Layer Communication
- Routing vs Switching

Module 3: Cisco Device Fundamentals

- Cisco Device Overview (Router, Switch)
- IOS Architecture
- Initial Setup & CLI Modes
- Basic Configuration (Hostname, IP, Passwords)
- VLAN & Trunk Configuration

- Static Routing
- DHCP & NAT Setup
- Configuration Backup & Restore

Module 4: Juniper Device Fundamentals

- Junos OS Overview
- Active vs Candidate Configuration
- User Interface & CLI Navigation
- Interface Setup & Management
- User Accounts & Authentication
- SNMP, Syslog, NTP Configuration
- Rescue Configuration & Rollback
- LAB: Basic Juniper Router Setup

Module 5: MikroTik Device Fundamentals

- MikroTik OS & Hardware Overview
- Winbox, WebFig & CLI Navigation
- Router Initial Setup (LAN, WAN, NAT)
- IP Addressing & DHCP Configuration
- DNS, NTP Setup
- License Level & Backup
- Log Server & Script Scheduler
- LAB: Basic Network Setup

Module 6: OLT & FTTx Fundamentals

- What is FTTx Technology

- GPON vs EPON Overview
- Optical Budget Calculation
- PON Topology Design
- Splitter Ratio & Fiber Distance Planning
- Wavelength & Power Loss Concepts
- Required Devices (OLT, ONU, Splitter)
- Safety in Fiber Deployment

Module 7: Core Network Design & Implementation

- Core Network Architecture
- Cisco & Juniper Integration
- Static Routing in Core
- Dynamic Routing Overview
- Link Aggregation (LACP)
- Redundancy & Failover Design
- Loop Prevention (STP/RSTP)
- LAB: Dual Core Setup

Module 8: Dynamic Routing Protocols

- OSPF Fundamentals
- Area & Router Types
- BGP Fundamentals (iBGP/eBGP)
- Policy-based Routing
- Route Preference & Filtering
- Load Balancing
- MPLS Overview

- LAB: OSPF + BGP in Multi-Vendor

Module 9: VLAN & Layer-2 Switching

- VLAN Concept & Configuration
- Inter-VLAN Routing
- Access & Trunk Port Setup
- Spanning Tree Protocol (STP)
- EtherChannel / LACP Configuration
- VLAN Management Protocols
- Troubleshooting VLAN Issues
- LAB: VLAN Between Cisco & Juniper

Module 10: Bandwidth Management

- MikroTik Queue Types
- PCQ & Burst Configuration
- Traffic Prioritization
- Application-based Bandwidth Control
- Time-based Queue Scheduling
- Traffic Shaping in Cisco/Juniper
- QoS (Quality of Service) Concepts
- LAB: Bandwidth Policy for ISP

Module 11: Security & Firewall

- Firewall Concept & Zones
- Juniper Firewall Filter
- MikroTik Firewall Rules (SrcNAT, DstNAT, Mangle)

- Cisco ACL Configuration
- IDS/IPS Introduction
- DoS & DDoS Mitigation Basics
- Web Proxy Access Control
- LAB: Multi-vendor Firewall Policy

Module 12: VPN & Remote Access

- VPN Concept & Types
- IPsec Configuration
- GRE, IPIP & EoIP Tunnel
- PPTP/L2TP Setup
- Site-to-Site VPN between Cisco & MikroTik
- Juniper Secure Tunnel
- Remote NOC Access Design
- LAB: Secure ISP VPN Connection

Module 13: DHCP, NAT & IP Allocation

- DHCP Server & Relay Configuration
- Static IP Binding
- PPPoE Server Setup
- Hotspot with Radius Authentication
- NAT (Static, Dynamic, PAT)
- Address Pool Management
- Public IP Allocation for Clients
- LAB: PPPoE + NAT in ISP

Module 14: Monitoring & Network Tools

- SNMP Configuration
- Prometheus & Grafana Basics
- Syslog & Log Analysis
- Ping, Traceroute, NetFlow
- Network Health Dashboard
- Alerting System Setup
- Resource Utilization Reports
- LAB: Monitor Multi-vendor Devices

Module 15: OLT Configuration & Management

- OLT Initial Setup
- ONU Authentication
- VLAN & Service Configuration
- PON Port Protection
- Remote Management
- LACP/RSTP Setup
- IGMP & ACL Service Enable
- LAB: Complete OLT Configuration

Module 16: ONU Configuration & Troubleshooting

- ONU VLAN & Bandwidth Configuration
- ONU Auto Registration
- Wi-Fi ONU Setup
- ONU User Connection Test
- Signal Power Check

- DHCP Snooping & Loopback Detection
- ONU Log Analysis
- LAB: ONU Troubleshooting Practical

Module 17: Network Redundancy & Failover

- HSRP/VRRP Configuration
- Dual Core Redundancy Design
- Link Aggregation & Load Sharing
- Backup Route Configuration
- Failover Test & Validation
- Spanning Tree Protection
- Route Reflector in BGP
- LAB: Failover Simulation

Module 18: ISP Service Management

- Client Onboarding Process
- Service Packages & Bandwidth Plans
- Billing Integration Overview
- User Authentication System (Radius)
- Customer Monitoring Portal
- Ticketing & Support Process
- Network Change Management
- LAB: Client Provisioning Workflow

Module 19: Troubleshooting & Maintenance

- Physical & Link Layer Issue Finding

- Routing & VLAN Troubleshooting
- Firewall & NAT Issue Check
- Optical Power & Signal Loss Test
- Configuration Backup Policy
- Software Upgrade & Rollback
- Performance Optimization
- LAB: Real-life Fault Scenarios

Module 20: Project & Certification

- ISP Network Design Project
- Simulation in EVE-NG / GNS3
- Documentation & Diagram Preparation
- Presentation & Review
- Final Assessment
- Certification Exam
- Career Guidance & Interview Tips
- Course Summary