CN 8815: Network Architectures

Course Description

This course covers the design aspects of large scale internets. It introduces the concept of route distribution and examines the use of Border Gateway Protocol (BGP) for interdomain routing. The applications of MPLS on Virtual Private Networks (VPNs) and traffic engineering are also studied.

Prerequisite: CN8813 and CN8812

Topics

Topics	hours
1) Controlling routing update: default route and route filtering (*notes*)	4
2) Border Gateway Protocol basics (BGP) (*Chapters 1-6 (II), Section 8.7.3 (I), notes*)	6
3) Manipulation of BGP attributes (*Chapters 6,11 (II), notes*)	6
4) Configuration Scenarios and Large-scale AS configuration (*Chapters 7,8,9,12 (II), notes*)	5
5) MPLS and Virtual Private Networks (*Chapter 10.3 (I), Chapter 1-3, 7-9 (III)*)	7
6) MPLS and Traffic Engineering (*Chapters 1-4 (IV)*)	5

COURSE EVALUATION

Lab reports	..... 15%
Lab examination (Feb. 26)	..... 15%
Mid-Term Tests (Feb. 4)	..... 25%
Final Examination (Feb. 25)	..... 45%

PRESCRIBED TEXT

References:

1. **I** "Communication Networks", by Leon-Garcia and Widjaja, McGraw Hill, 2004, ISBN 0-07-246352-x.

2. **II** "Internet Routing Architectures", 2nd Edition, by Sam Halabi with Danny McPherson, Cisco Systems, Cisco Press , ISBN 1-57870-233-X.

3. **III** "MPLS and VPN Architectures", by Ivan Pepelnjak and Jim Guichard, Cisco System, Cisco Press, ISBN 1-58705-002-1.

4. **IV** "MPLS Traffic Engineering" By Umesh Lakshman, Lancy Lobo, Cisco Systems, Cisco Press.

5. RFC Documents:

- RFC 4271: BGP-4
- RFC 1772: Application of the BGP in the Internet
- RFC 2545: Use of BGP multiprotocol Extensions for IPv6 Inter-Domain Routing
- RFC 4364: BGP/MPLS VPN Fundamentals
- RFC 4659: BGP/MPLS IP VPN Extension for IPv6 VPN
- RFC 2585: Multiprotocol Extension for BGP-4
- RFC 3031: MPLS Architecture

6. Cisco Documents:

- Controlling Routing Update
- Configuring a Gateway of Last Resort Using IP Command
- Redistributing Routing Protocols
- Configuring BGP
- Cisco BGP tutorial

LABS

1. Controlling Routing Updates
2. BGP Labs
    - IBGP Characteristics and Synchronization
    - Route Filtering
    - Manipulation of BGP Attributes
    - Route Aggregation
    - Configuration of Single-Home and Multi-Home ASs.
3. MPLS and VPN