FINAL INTERNSHIP REPORT

I have completed the Internship Program as per details below:

Course Title	:	Networking
Location (Institute, City, Country)	:	VinaREN , City, Hanoi
Commencement Date & Duration	:	1st July, 2012
Completion Date	:	31st July, 2012

The courses/subjects covered during this Internships Program are:

1. **OSI - TCP/IP - Application Layer Services**
    a. Introduction
    b. The Application layer
    c. The Presentation Layer
    d. Network-Aware Applications
    e. Application layer Services
    f. The Client/Server model
    g. Servers
    h Application Layer Services and Protocols
    i. The Peer-to-Peer Model
    j. Peer-to-Peer Networks
    k. Peer-to-Peer Applications
    l. DNS Services and Protocol
    m. DNS
    n. Some of these record types
    o. WWW Service and HTTP
    p. Email Services and SMTP/POP Protocols
    q. E-mail Server Processes - MTA and MDA
    r. FTP
    s. DHCP
    t. Telnet Services and Protocol

2. **Basic Router Configuration**
    a. Router Configuration
    b. Router modes
    c. Router name
    d. Password on Router
    e. Password Encryption
    f. Interface names
    g. Configuring Serial Interfaces
    h. Configuring Fastethernet Interfaces
    i. Basic command
    j. Configuring Global Parameters
    k. Configuring WAN interface
    l. Configuring a Loopback Interface
    m. Configuring Command-Line Access to the Router
    n. Saving Configurations
    o. Erasing Configurations
    p. Basic Show Command
    q. Configuration Example

r. Cisco Routers Boot Process
s. The Cisco router boot up process has three stages
t. Perform Power-on self test (POST) and load the bootstrap program
u. Locate and load the Cisco IOS software
v. Locate and execute the startup configuration file or enter setup mode
w. Startup Configuration File
x. Running Configuration File

3. Password Recover of Cisco Router 2811

- Recovery Password Cisco Router 2811

4. IP Addressing

Introduction

a. Classful IP addresssing
   - The High Order Bits
   - The IPv4 Classful Addressing Structure
   - Example of Classful Routing Updates
   - The Move Towards Classless Addressing

b. Classless IP addressing
   - CIDR and Route Summarization
   - Classless routing protocols include RIPv2, EIGRP, OSPF, IS-IS, and BGP

c. Route Summarization
   - Calculating Route Summarization

d. How to Subnet
e. VLSM
f. Basic VLSM Calculation and Addressing Design
g. Challenge VLSM Calculation and Addressing Design

5. Static Routing

a. Static Routing
   - Role of the Router
   - Purpose and Command Syntax of ip route
   - Static routes
   - The *ip route* command
   - Installing a Static Route in the Routing Table
   - Verifying the Static Route
   - Configuring Routes to Two More Remote Networks
   - Verify Static Route Configuration in the figure

b. Routing Table Principles

   I. Principle 1: "Every router makes its decision alone, based on the information it has in its own routing table."

   II. Principle 2: "The fact that one router has certain information in its routing table does not mean that other routers have the same information."

   III. Principle 3: "Routing information about a path from one network to another does not provide routing information about the reverse, or return path."

c. Applying the Principles

- Would packets from PC1 reach their destination?
- Does this mean that any packets from these networks destined for 172.16.3.0/24 network will reach their destination?

d. Recursive Route Lookup
e. Configuring a Static Route with an Exit Interface
f. Static Route and an Exit Interface
g. Static routes and point-to-point networks
h Modifying Static Routes
i. Verifying the Static Route Configuration
j. Verifying Static Route Changes
k. Show ip route in the figure

l. Ping in the figure
- ✓ Static Routes with Ethernet Interfaces
- ✓ Ethernet Interfaces and ARP
- ✓ Sending an ARP Request
- ✓ Static routes and Ethernet exit interfaces
- ✓ Advantages of using an exit interface with static routes
- ✓ Summarizing Routes to Reduce the Size of the Routing Table

m. Route Summarization
- ➢ Calculating a summary route
- ➢ Configuring a Summary Route
- ➢ Effect of Summary Route in the figure
- ➢ Verify Summary Route in the figure
- ➢ Default Static Route
- ➢ Configuring a Default Static Route
- ➢ Verifying a Default Static Route

6. OSPF_- Open shortest path first

OSPF Part I

a. Introduction
b. OSPF Packet
c. Hello Protocol
d. Neighbor Establishment
e OSPF Hello and Dead Intervals
f Electing a DR and BDR
g Lab Topology
h The Router OSPF Command
i. The Network Command
j. OSPF Router ID
k. Verifying Router ID
l. Loopback Address
m. The OSPF router-id command
n. Modifying the Router ID
o. Duplicate Router IDs
p. Verifying OSPF

OSPF – Part II

a OSPF Data Structures

b. OSPF Adjacency Database
c. OSPF Area Structure
d. OSPF Router Types
e. OSPF Terminology
f. Calculating the OSPF Metric
g. Link-State Data Structures
h. OSPF Network Types
i. Adjacency Behavior for a Point-to-Point Link
j. Adjacency Behavior for a Broadcast Link
k. Selecting the DR and BDR
l. Adjacency Behavior for a NBMA Network
m. DR Election in NBMA Topology
n. OSPF Over Frame Relay
o. OSPF over NBMA Topology Modes
p. Configuring the OSPF Network Type
q. Configuring OSPF over Frame Relay
r. Using the neighbor Command
s. The show ip ospf neighbor Command
t. Point-to-Multipoint Configuration
u. Point-to-Multipoint Nonbroadcast Configuration
v. Configuring a Point-to-Point Subinterface
w. Configuring a Multipoint Subinterface

OSPF – Part III

a. Multiarea OSPF Operation
b. Large OSPF Network Issues
c. OSPF LSA Types

    i. Type 1
    ii. Type 2
    iii. Type 3
    iv. Type 4
    v. Type 5
    vi. Type 6
    vii. Type 7
    viii. Type 8
    ix. Types 9, 10, and 11

d. Interpreting the OSPF LSDB and Routing Table
e. Interpreting the Routing Table
f. Calculating Costs for E1 and E2 Routes
g. Configuring OSPF LSDB Overload Protection
h. Changing the Cost Metric
i. Stub, Totally Stubby, and Not-So-Stubby Areas
    i. Configuring OSPF Area Types
    ii. Using Stub and Totally Stubby Areas
    iii. Configuring Stub Area
    iv. OSPF Stub Area Configuration Example
    v. Configuring Totally Stub Areas
    vi. Totally Stubby Area Configuration Example
    vii. Interpreting Routing Tables
    viii. Configuring Not-So-Stubby Areas
    ix. Configuring Not-So-Stubby Area Example
    x. Configuring an NSSA Totally Stubby Area Example
    xi. Verifying All Stub Area Types

j. Virtual Link
    i. OSPF Virtual Links
    ii. Configuring Virtual Links
    iii. Virtual Link Configuration Example
    iv. Verifying a Virtual Link Configuration

OSPF – Part IV

a. Route Summarization

- ABR and ASBR Implementation
- OSPF Route Summarization Example
- Configuring OSPF Route Summarization
- Configuring Route Summarization at ABR
- Configuring Route Summarization at ASBR
- Benefits of a Default Route in OSPF
- Configuring a Default Route in OSPF
- Example of Configuring a Default Route in OSPF

b. OSPF Authentication

- OSPF Authentication Methods
- Configuring Simple Password Authentication
- Example of Configuring Simple Password Authentication
- Configuring MD5 Authentication
- Example of Configuring MD5 Authentication
- Troubleshooting Simple Password Authentication

7. BGP – Border Gateway Protocol

BGP – Part I

a. BGP Concepts and Terminology
- Overview
- Using BGP in the Enterprise Network
- BGP Multihoming Options
- Option 1: Default Routes from All Providers
- Option 2: Default Routes and Partial Updates
- Option 3: Full Routes from All Providers
- BGP Routing Between Autonomous Systems
- BGP Routing Policies
- Features of BGP

b. EBGP and IBGP
- BGP Neighbor Relationships
- Establishing a Connection Between External BGP Neighbors
- Establishing a Connection Between Internal BGP Neighbors
- Synchronization Within an Autonomous System
- IBGP in a Nontransit Autonomous System
- Routing Issues in a Transit Autonomous System

c. Configuring BGP

- Basic BGP Configuration
- Activate a BGP Session

- Shutting Down a BGP Neighbor
- BGP Configuration Considerations
- IBGP Peering Issue
- BGP neighbor update-source Command
- EBGP Peering Issue
- Next Hop Behavior
- BGP neighbor next-hop-self Command
- Injection Routing Information into BGP
- BGP network Command Example
- BGP Synchronization
- BGP Synchronization Example
- BGP Configuration Example

BGP – Part 2

a. Advanced BGP Configuration and Verification
   - BGP Neighbor States
   - BGP Established and Idle States
   - BGP Active State Troubleshooting
   - Configuring a Peer Group
   - Configuring a Peer Group Example
   - BGP Peering
   - Configuring BGP Authentication
   - Troubleshooting BGP
   - Clearing the BGP Session
   - Hard Reset of BGP Sessions
   - Soft Reset of BGP Sessions
   - The debug ip bgp Command

b. Selecting a BGP Path
   - Characteristics of BGP Attributes
   - BGP Attributes
   - AS Path Attribute
   - Next-Hop Attribute
   - Origin Attribute
   - Local Preference Attribute
   - MED Attribute
   - Weight Attribute
   - Determining the BGP Path Selection
   - Selecting a BGP Path
   - Path Selection with Multihomed Connection

c. Manipulating BGP Path Selection with Route Maps
   - Setting Local Preference with Route Maps
   - Setting Local Preference with Route Maps Example
   - Changing the BGP Local Preference for All Routes
   - BGP Local Preference Example
   - BGP Local Preference Example (continued)
   - BGP Local Preference Example (continued)
   - Setting the MED with Route Maps
   - BGP Using Route Maps and the MED Example
   - BGP Using Route Maps and the MED Example (continued)
   - BGP Using Route Maps and the MED Example (continued)
   - Implementing BGP in the Enterprise

8. **Labs on BGP:**
    1. Configuring BGP with Default Routing
    2. Using the AS_PATH Attribute
    3. Configuring IBGP and EBGP Sessions, Local Preference and MED
    4. BGP Route Reflectors and Route Filters and some more labs.

9. **Other Activities.**
    a. Visited Do San beach with the staff of VinaREN.

Acknowledgement

I would like to sincerely acknowledge Royal University of Bhutan and Asian Institute of Technology for granting me to attend TEIN3 HRD Internship Program opportunity for this very particular and important Internship Program which will definitely enhance my working proficiency and skills as a whole.

My sincere gratitude also goes to Mr. Duy nm VinaREN our resource person for his valuable teaching.

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