



INTERNATIONAL CIVIL AVIATION ORGANIZATION

Regional Project RLA/03/901 – REDDIG Management System and Satellite Segment Administration

COURSE ON IP NETWORKS APPLIED TO THE REDDIG II (Manaus, Brazil, 13 to 17 November 2017)

CONTENTS

Day 1

1. InternetNetworking

- OSI model and TCP / IP model
- Basic functions of the physical layer, link, network and transport
- Encapsulation, PDU overhead

2. Operation of the Cisco IOS software

- Characteristics and functions
- CLI User and Privileged modes
- Basic commands on privileged mode
- Help commands
- Error messages (logs)
- Types of router memories
- Presentation on router hardware and switches used in REDDIG

3. LAN

- Collision domain and broadcast
- Differences between hubs and switches
- Frame Ethernet
- Mac Address and types of network communications (undissemination / broadcast / multicast)
- Frame routing in a switch
- Full-Duplex and half-Duplex modes and speed (troubleshooting)
- Hardware y software features of the Netgear switch

4. VLAN

- Importance of the VLANs
- Frame Ethernet 802.1q
- Types of VLAN interfaces (trunk / Access)
- Native VLAN in a port
- STP
- Configuration of VLANs in Netgear
- REDDIG VLANs mapping

5. VLANs (Packet Trace and Netgear) configuration laboratory

Day 2

1. IP addressing

- IP header
- IP addressing types (compare with REDDIG addressing)
- Subnetting / Masks
- VLSM
- REDDIG IP addressing structure
- IP addressing laboratory / Subnet

2. Transportation layer

- TCP / UDP differences
- ¿Which REDDIG applications use TCP and UDP?

3. Initial configuration of a router and a switch

- Initial logical configuration of the Cisco router and Netgear switch
- Interface and administrative IP addressing
- Software licenses
- Types of router access
- CDP / LLDP
- ARP
- Brief example on how a package travels in a switch and router network

4. VRRP

- Operation
- Advantages
- REDDIG VRRP configuration
- Priority
- IPSLA Tracks

5. IP routing

- Router operation
- Features of a Cisco router (CEF)
- Path determination and routing table
- Administrative distance
- Route types (direct, static, dynamic and default) – show the REDDIG routing table as reference

Day 3

1. Static routing

- Advantages and disadvantages of static routings
- Manners for the configuration of static routes (next-hop / interface)
- Default routes
- Configuration of static routes in REDDIG (Level-3)
- Show IP route

2. Dynamic routing

- Areas
- Router types in OSPF (DR, BDR, ASBR, ABR)
- LSDB / SPF / Hello
- Vicinity and adjacency (see REDDIG router)
- Status of an interface with adjacency
- DR / BDR selection
- LSA / LSA types
- Troubleshooting commands
- SH IP OSPF information, REDDIG router data base
- SH IP OSPF neighbours status

3. Inter-VLAN routing

- VLAN routing objectives
- VLAN routing s in the REDDIG trunks

4. Laboratories involving static, dynamic and inter-VLAN routing

Day 4

1. Access lists

- Use of ACLs
- ACL types
- Construction of ACLs
- Wildcards
- ACLs used in REDDIG

2. NAT

- Use of NAT
- NAT types (static, PAT)
- Use of NAT in REDDIG

3. QoS

- Importance
- Basic parameters of a network (jitter, delay, loss of packages)
- Diffserv
- Traffic classification
- Policers
- QoS application in interfaces
- Troubleshooting commands for QoS
- QoS configuration in REDDIG Cisco routers

4. Traffic tunnelling

- Operation
- BSTUN
- GRE
- Tunnel configuration in REDDIG

5. Laboratories involving ACL, NAT, QoS and tunnels)

Day 5

1. VOIP

- Analogue and digital interfaces
- Basic protocol concepts in SIP signalling
- Codec types
- VOIP configuration in Cisco
- Call-manager
- Dial-peers
- Translation rules
- VOIP configuration in REDDIG

2. WAN technologies

- Link layer protocols
- Point-to-point link configuration
- Configuration of WAN links in the SkyWAN modems
- Configuration of routing protocols in SkyWAN modems

3. MPLS

- Basic operation concepts of the service provider MPLS network
- REDDIG traffic routing through the Level-3 MPLS network