A set of competition tasks for the SYSTEMS MANAGEMENT discipline NETWORK for use in the Professional Skills Competition NETWORK SYSTEM MANAGEMENT, organized as part of the project "SkillsComp: Skills competitions as an opportunity to develop vocational education and training" in Warsaw on March 21-22, 2024

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Semi-final task

Design and implementation part

Introduction

The competition task contains a network topology that is not fully designed and configured.
The participant's task is to design and configure the specified network components. The task has a 90-minute time limit, and before that time, the saved simulation file must be uploaded to netacad.com to the "?????????" class on netacad.com, along with a text file. The text file is used to record the design steps.

ISP-A addressing table

Device Name Interface lewy.konkurs.edu			Services
Ethernet prawy.konkurs.edu Ethernet		Address	DNS, www
		201.1.10.100/24 201.1.20.200/24 2001:cafe:1:20::200/64	DNS, www
ISP-A	G0/0/0.10	201.1.10.1/24	
	G0/0/0.20	201.1.20.1/24 2001:cafe:1:20::1/64	
	G0/0/2	172.31.12.1/30	
	S0/2/0	172.31.12.5/30	

Tasks to be completed:

Preparing IPv4 addressing

Assumptions:

- There are two networks available:
  - o 201.10.10.0/24 – public for splitting using VLSM
  - o 10.0.0.0/8 – private for convenient management splitting. Use length subnet prefix /24
- The L3 network backbone (Layer 3 connections) are the links between:
  - Headquarters – Branch (private address)
  - o Headquarters – C1 (public addressing)
  - about C1 – C2 (private address)
  - o C2 – GS server (private addressing)
  - o Branch – Od1 (private address)
- The public address space should be divided as follows:
  1. Vlan 10, name: DC-A: 20 hosts
  2. Vlan 20, name: DC-B: 12 hosts
  3. Vlan 30, name: DC-C: 6 hosts
  4. Central – C1: 2 hosts
- The order of assigning subnet addresses (according to the rule from largest to smallest) is as follows: above and maintaining continuity
- The private addressing space should be divided as follows:

- o C1 – C2: first (zero) subnet according to the 10.1.x.0/24 scheme
- o C2 – GS server: second subnet according to the 10.1.x.0/24 scheme
- o Headquarters – Branch: third subnet according to the 10.1.x.0/24 scheme
- o Branch – Od1: fourth subnet according to the 10.1.x.0/24 scheme
- o Network Admin: 10.2.1.0/24
- o Vlan 40, name: Prac0 – subnet according to the scheme 10.3.v.0/24, v- vlan number
- o Vlan 41, name: Prac1 – subnet according to the scheme 10.3.v.0/24, v- vlan number
- o Vlan 42, name: Prac2 – subnet according to the scheme 10.3.v.0/24, v- vlan number
- o Vlan 50, name: Gr1 – subnet according to the scheme 10.4.v.0/24, v- vlan number
- o Vlan 60, name: Gr2 – subnet according to the scheme 10.4.v.0/24, v- vlan number
- o Vlan 70, name: Gr3 – subnet according to the scheme 10.4.v.0/24, v- vlan number

Preparing IPv6 addressing

Assumptions:

- The prefix 2001:bac:a::/48 is available
- Use the fourth hextet to create a subnet according to the following scheme:
  - o Vlan 10, name: DC-A: 2001:bac:a:a::/64
  - o Vlan 20, name: DC-B: 2001:bac:a:b::/64
  - o Vlan 30, name: DC-C: 2001:bac:a:c::/64
  - o Headquarters – C1: 2001:bac:a:1::/64
  - o Network Admin: 2001:bac:a:2::/64

Network backbone configuration

- Turn on C1 and C2
- Configure the IPv4 connection interfaces Central – C1 using the first available address IPv4 on Central and the second on C1. Subnet according to the addressing plan.
- Configure the IPv6 Central – C1 connection interfaces using interface identifiers 1 on Central and 2 on C1. Subnet according to the addressing plan. Match the link local addresses to the interface ID from the global address.
- Configure the IPv4 connection interfaces Headquarters – Branch using the first available IPv4 address on Headquarters and the second on Branch. Subnet according to the addressing plan.
- Configure the IPv4 connection interfaces Branch – Branch1 using the first available address IPv4 on Branch and the second on Branch1. Subnet according to the addressing plan.
- Configure Layer 3 Etherchannel 1 between C1 - C2. Use PAgP protocol and mode desirable. Assign the last two addresses from the pool, but the lower one to C1.
- Configure the IPv4 C2 – GS server connection interfaces using the first available one IPv4 address on C2 and the last one on the GS server. Subnet according to the addressing plan. Include the default gateway.
- Activate configured interfaces

Prac network segment configuration

- Connect SW-C2 to C2 with Gigabit ports on both sides (lowest port numbers available). Configure an 802.1q trunk
- Create three vlans with numbers 40,41,41 and names as in the addressing plan description on both switches
- Divide the fastethernet port range on SW-C2 into three parts and assign them to VLANs accordingly 40,42,42

- Connect hosts to the first ports of the individual vlans: PC3:vlan 40, PC4:vlan 41, PC5: vlan 42.
- Enable inter-VLAN routing on C2. Use the first addresses from the subnet pool for addressing SVI interfaces
- Configure a DHCPv4 server on C2 for the three vlans above. Use the same pool names as the vlan names. Exclude the first 10 addresses from the subnet. Use the DNS server address: 201.1.20.200. Include default gateways. Configure hosts PC3-5 for automatic IPv4 configuration.

Admin Network Segment Configuration

- Connect C1 to SW-C1 using the last available ports. Convert the port on C1 as an L3 (router) port and configure IPv4 and IPv6 using the first addresses in the pool. Ensure consistency of the IPv4 host portion, interface ID for the IPv6 GUA, and IPv6 link-local address.
- Configure stateless DHVPv6 on C1 for the Admin network. Pool name Admin. For the DNS server address, use: 2001:CAFE:1:20::200. Configure hosts for IPv6 autoconfiguration
- Configure PC1 and PC2 with static IPv4 addresses (the next available ones). As the DNS server address use: 201.1.20.200

DC network segment configuration

- Configure vlans on C1 and SW-DC according to the assumptions in the addressing plan.
- Enable routing between VLANs for IPv4 and IPv6. Use the first addresses from individual subnet pools on the created interfaces.
- Configure an 802.1q trunk between C1 and SW-DC
- Assign servers to vlans accordingly: DC-A:vlan10, DC-B:vlan20; DC-C:vlan30
- Configure server IPv4 and IPv6 addresses statically using the second available addresses

Configuring OSPF and IPv4 Default Routing

- On all ospf routers the process ID should be 1
- Configure OSPF on Headquarters and Branch specifying router-id (1.1.1.1 and 1.1.1.2 respectively) and interfaces involved in the process with the ip ospf command. •

Configure OSPF on C1 and C2 using the network commands. Include all networks with their masks and configure passive interfaces where appropriate.

- Configure default routing to ISP-A on Headquarters and Branch using the next-hop IPv4 address. The default route from the Headquarters router should be the primary route and the route from the Branch router should be the backup (use an administrative distance of 115). Advertise the default routes in OSPF

PAT configuration

- Hosts with private IPv4 addressing (10.0.0.0) are to use PAT service when communicating to ISP-A.
- Hosts with public addressing are to communicate bypassing the PAT service
- The PAT service is to run on the Headquarters and Branch routers. The translation is to use the address of the interfaces connecting to ISP-A.
- Use ACL number 1 with one entry.

IPv6 routing configuration

- Configure static routing on Centrala to route IPv6 packets to the network internal. Make static entries separately for each network, indicating IPv6 GUA next-hop router.

- Configure IPv6 default routing on C1 to route packets to external networks through the router Central pointing to the IPv6 GUA of the next hop router.

ACL configuration

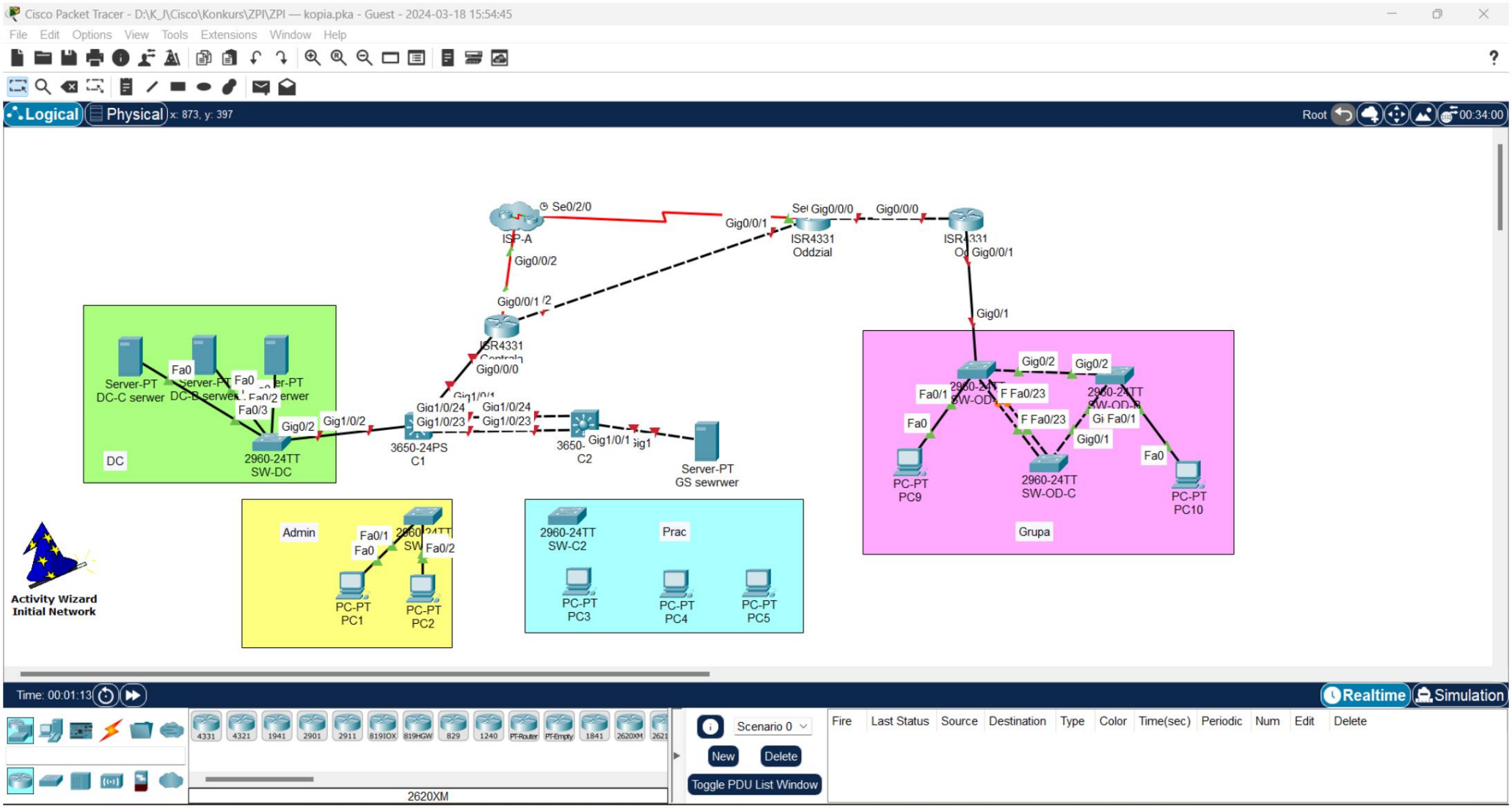
- Restrict access to the DC-A server IPv4 subnet from all IPv4 subnets of the network segment Group (10.4.v.0/16) for http and https protocols only. Allow other IPv4 traffic between subnets. Configure an ACL on the Branch router. Use the ACL name: ACL-DC-A
- Only the DC-B server should not be reachable via IPv6 from external networks. Use the ACL name: ACL-DC-B

Network segment configuration Group

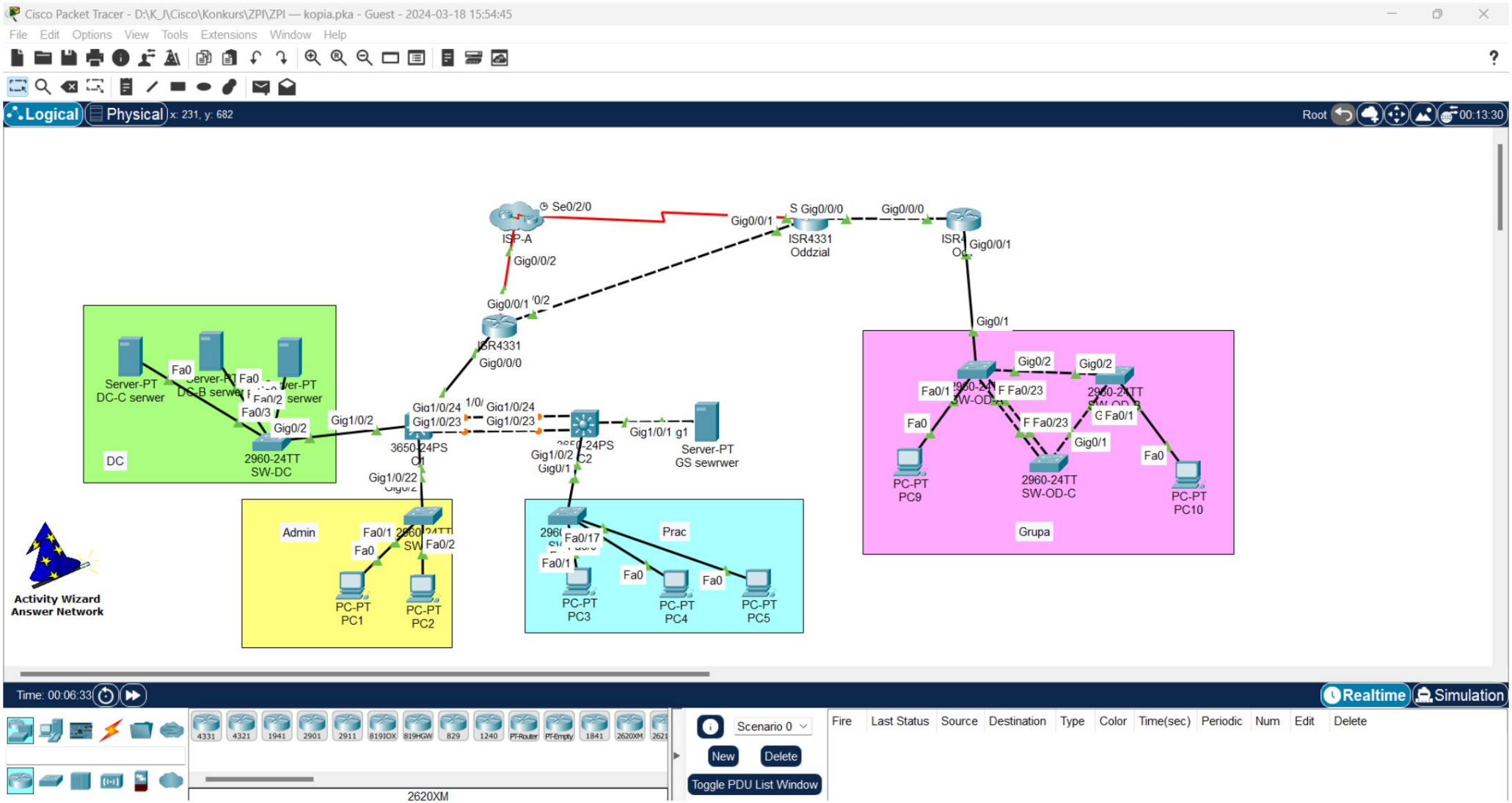
- Configure Etherchannel 1 between SW-OD-A and SW-OD-C using LACP and mode active. Configure link as trunk
- Configure the connections between the remaining switches as trunks as well. • Configure VLAN 50 and VLAN 60 on all three switches.
- Enable routing between defined VLANs on Od1. Use the first addresses from the subnet pool for addressing subinterfaces. Subinterface numbers match VLAN numbers
- Assign host PC9 to VLAN 50 and PC10 to VLAN 60.
- Configure hosts with IPv4 addressing. Use secondary addresses from the pool for subnets.
- Change the STP protocol mode on the switches to rapid-pvst. SW-OD-A should be the root bridge for both vlans. Make the appropriate configuration without explicitly specifying the priority.

- Change the management interface on all three switches to VLAN50. Configure IPv4 addresses using the last three addresses from the pool for the SW-OD-A, SW-OD-B, SW-OD-C switch (the last one), respectively.
- Prepare the SW-OD-A switch for remote management using SSH. Domain: konkurs.com, key length 1024, user: admin1 with password cisco1 (password should not be in clear text). Configure all lines.
- Configure OSPF on Od1 using the network commands and interface addresses and masks.

Initial topology



Final topology



Initial and final configurations of the design and implementation task

C1 - initial	C1 - final
Lack	! version 16.3.2 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname C1 ! ! no ip cef ip routing ! ipv6 unicast-routing ! no ipv6 cef! ipv6 dhcp pool admin dns-server 2001:CAFE:1:20::200 ! ! ! spanning- tree mode pvst ! ! interface Port-channel1 no switchport ip address 10.0.1.1 255.255.255.0 ! interface GigabitEthernet1/0/1 no switchport ip address 201.10.10.58 255.255.255.252 duplex auto speed auto ipv6 address FE80::2 link-local ipv6 address 2001:BAC:A:1::2/64 ! interface GigabitEthernet1/0/2 switchport mode trunk ! ! interface GigabitEthernet1/0/22 no switchport ip address 10.2.1.1 255.255.255.0 duplex auto speed auto ipv6 address FE80::1 link-local ipv6 address 2001:BAC:A:2::1/64 ipv6 nd other-config- flag ipv6 dhcp server Admin ! interface GigabitEthernet1/0/23

	no switchport no ip address channel-group 1 mode desirable duplex auto speed auto ! interface GigabitEthernet1/0/24 no switchport no ip address channel-group 1 mode desirable duplex auto speed auto ! ! interface Vlan1 no ip address shutdown ! interface Vlan10 mac-address 00d0.baab.2d01 ip address 201.10.10.1 255.255.255.224 ipv6 address FE80::1 link-local ipv6 address 2001:BAC:A:A::1/64 ! interface Vlan20 mac-address 00d0.baab.2d02 ip address 201.10.10.33 255.255.255.240 ipv6 address FE80::1 link-local ipv6 address 2001:BAC:A:B::1/64 ! interface Vlan30 mac-address 00d0.baab.2d03 ip address 201.10.10.49 255.255.255.248 ipv6 address FE80::1 link-local ipv6 address 2001:BAC:A:C::1/64 ! router ospf 1 log-adjacency- changes passive- interface GigabitEthernet1/0/2 passive-interface GigabitEthernet1/0/22 network 10.0.1.0 0.0.0.255 area 0 network 10.2.1.0 0.0.0.255 area 0 network 201.10.10.0 0.0.0.31 area 0 network 201.10.10.32 0.0.0.15 area 0 network 201.10.10.48 0.0.0.7 area 0 network 201.10.10.56 0.0.0.3 area 0 ! ip classless! ip flow- export version 9 !

	ipv6 route ::/0 2001:BAC:A:1::1 ! ! line con 0 ! line aux 0 ! line vty 0 4 login ! ! end

C2 - initial	**C2 - final !** version
Lack	16.3.2 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname C2 ! ! ! ip dhcp excluded- address 10.3.40.1 10.3.40.10 ip dhcp excluded-address 10.3.41.1 10.3.41.10 ip dhcp excluded-address 10.3.42.1 10.3.42.10 ! ip dhcp pool Prac0 network 10.3.40.0 255.255.255.0 default-router 10.3.40.1 dns- server 201.1.20.200 ip dhcp pool Prac1 network 10.3.41.0 255.255.255.0 default- router 10.3.41.1 dns-server 201.1.20.200 ip dhcp pool Prac2 network 10.3.42.0 255.255.255.0 default-router 10.3.42.1 dns-server 201.1.20.200 ! ! ! no ip cef ip routing ! no ipv6 cef! ! ! spanning-tree mode pvst

	! ! interface Port-channel1 no switchport ip address 10.0.1.2 255.255.255.0 ! interface GigabitEthernet1/0/1 no switchport ip address 10.1.1.1 255.255.255.0 duplex auto speed auto ! interface GigabitEthernet1/0/2 switchport mode trunk ! ! interface GigabitEthernet1/0/23 no switchport no ip address channel-group 1 mode desirable duplex auto speed auto ! interface GigabitEthernet1/0/24 no switchport no ip address channel-group 1 mode desirable duplex auto speed auto ! ! interface Vlan1 no ip address shutdown ! interface Vlan40 mac-address 000c.cfd8.5301 ip address 10.3.40.1 255.255.255.0 ! interface Vlan41 mac-address 000c.cfd8.5302 ip address 10.3.41.1 255.255.255.0 ! interfaceVlan42 mac-address 000c.cfd8.5303 ip address 10.3.42.1 255.255.255.0 ! router ospf 1 log- adjacency-changes passive-interface GigabitEthernet1/0/1 passive-interface GigabitEthernet1/0/2 network 10.0.1.0 0.0.0.255 area 0 network 10.1.1.0 0.0.0.255 area 0 network 10.3.40.0 0.0.0.255 area 0

	network 10.3.41.0 0.0.0.255 area 0 network 10.3.42.0 0.0.0.255 area 0 ! ip classless! ip flow- export version 9 ! ! line con 0 ! line aux 0 ! line vty 0 4 login ! ! end

Central - initial ! version 15.4	**Central - final**
no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname Headquarters ! ! no ip cef ipv6 unicast- routing ! no ipv6 cef! ! spanning- tree mode pvst ! interface GigabitEthernet0/0/0 no ip address duplex auto speed auto shutdown ! interface GigabitEthernet0/0/1 no ip address duplex auto speed auto shutdown ! interface GigabitEthernet0/0/2 ip address 172.31.12.2 255.255.255.252 ipv6 address FE80::2 link-local ipv6 address 2001:CAFE:1:1:A::2/80	! version 15.4 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname Headquarters ! no ip cef ipv6 unicast-routing ! no ipv6 cef! ! spanning-tree mode pvst ! ! interface GigabitEthernet0/0/0 ip address 201.10.10.57 255.255.255.252 ip ospf 1 area 0 ip nat inside duplex auto speed auto ipv6 address FE80::1 link-local ipv6 address 2001:BAC:A:1::1/64 ! interface GigabitEthernet0/0/1 ip address 10.1.2.1 255.255.255.0 ip ospf 1 area 0 ip nat inside duplex auto speed auto !

! interface Vlan1 no ip address shutdown ! ip classless! ip flow- export version 9 ! ! line con 0 ! line aux 0 ! line vty 0 4 login ! ! ! end	interface GigabitEthernet0/0/2 ip address 172.31.12.2 255.255.255.252 ipv6 traffic-filter ACL-DC-B in ip nat outside ipv6 address FE80::2 link-local ipv6 address 2001:CAFE:1:1:A::2/80 ! interface Vlan1 no ip address shutdown ! router ospf 1 router-id 1.1.1.1 log-adjacency-changes default-information originate ! ip nat inside source list 1 interface GigabitEthernet0/0/2 overload ip classless ip route 0.0.0.0 0.0.0.0 172.31.12.1 ! ip flow-export version 9 ! ipv6 route ::/0 2001:CAFE:1:1:A::1 ipv6 route 2001:BAC:A:A::/64 2001:BAC:A:1::2 ipv6 route 2001:BAC:A:B::/64 2001:BAC:A:1::2 ipv6 route 2001:BAC:A:C::/64 2001:BAC:A:1::2 ipv6 route 2001:BAC:A:2::/64 2001:BAC:A:1::2 ! access-list 1 permit 10.0.0.0 0.255.255.255 ipv6 access-list ACL-DC-B deny ipv6 any host 2001:BAC:A:B::2 permit ipv6 any any ! ! line con 0 ! line aux 0 ! line vty 0 4 login ! ! end

IPS-A - Initial ! Version 15.4	**IPS-A - final**
	Configuration unchanged

no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname ISP- A ! ! ip cef ipv6 unicast- routing ! no ipv6 cef! ! spanning-tree mode pvst ! ! interface GigabitEthernet0/0/0 no ip address duplex auto speed auto ! interface GigabitEthernet0/0/0.10 encapsulation dot1Q 10 ip address 201.1.10.1 255.255.255.0 ! interface GigabitEthernet0/0/0.20 encapsulation dot1Q 20 ip address 201.1.20.1 255.255.255.0 ipv6 address FE80::1 link-local ipv6 address 2001:CAFE:1:20::1/64 ! interface GigabitEthernet0/0/1 no ip address duplex auto speed auto shutdown ! interface GigabitEthernet0/0/2 ip address 172.31.12.1 255.255.255.252 ipv6 address FE80::1 link-local ipv6 address 2001:CAFE:1:1:A::1/80 ! interface Serial0/2/0 ip address 172.31.12.5 255.255.255.252 clock rate 2000000 ! interface Serial0/2/1 no ip address clock rate 2000000 shutdown ! interface Vlan1	

no ip address shutdown ! ip classless ip route 201.10.10.0 255.255.255.0 172.31.12.2 ip route 201.10.10.0 255.255.255.0 172.31.12.6 5 ! ip flow-export version 9 ! ipv6 route 2001:BAC:A::/48 2001:CAFE:1:1:A::2 ! ! line con 0 ! line aux 0 ! line vty 0 4 login ! ! end	

From1 - starting ! version	**Od1 - final !** version
15.4 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname From1 ! ip cef no ipv6 cef ! spanning- tree mode pvst ! ! interface GigabitEthernet0/0/0 no ip address duplex auto speed auto shutdown ! interface GigabitEthernet0/0/1 no ip address duplex auto speed auto shutdown	15.4 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname From1 ! ! ip cef no ipv6 cef ! ! spanning-tree mode pvst ! interface GigabitEthernet0/0/0 ip address 10.1.3.2 255.255.255.0 duplex auto speed auto ! interface GigabitEthernet0/0/1 no ip address duplex auto speed auto ! interface GigabitEthernet0/0/1.50 encapsulation dot1Q 50

! interface GigabitEthernet0/0/2 no ip address duplex auto speed auto shutdown ! interface Vlan1 no ip address shutdown ! ip classless! ip flow-export version 9 ! ! line con 0 ! line aux 0 ! line vty 0 4 login !! ! end	ip address 10.4.50.1 255.255.255.0 ! interface GigabitEthernet0/0/1.60 encapsulation dot1Q 60 ip address 10.4.60.1 255.255.255.0 ! interface GigabitEthernet0/0/2 no ip address duplex auto speed auto shutdown ! interface Vlan1 no ip address shutdown ! router ospf 1 log- adjacency-changes network 10.1.3.2 0.0.0.0 area 0 network 10.4.50.1 0.0.0.0 area 0 network 10.4.60.1 0.0.0.0 area 0 ! ip classless! ip flow-export version 9 ! ! line con 0 ! line aux 0 ! line vty 0 4 login ! ! ! end

Branch - Initial ! Version	**Branch - Final !**
16.6.4 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname Branch ! no ip cef no ipv6 cef ! ! spanning- tree mode pvst !	Version 15.4 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname Branch ! no ip cef no ipv6 cef ! ! spanning- tree mode pvst !

interface GigabitEthernet0/0/0 no ip address duplex auto speed auto ! interface GigabitEthernet0/0/1 no ip address duplex auto speed auto ! interface GigabitEthernet0/0/2 no ip address duplex auto speed auto ! interfaceSerial0/2/0 ip address 172.31.12.6 255.255.255.252 ! interface Serial0/2/1 no ip address clock rate 2000000 ! interface Vlan1 no ip address ! ip classless! ip flow-export version 9 ! ! line con 0 ! line aux 0 ! line vty 0 4 login ! ! ! end	! interface GigabitEthernet0/0/0 ip address 10.1.3.1 255.255.255.0 ip ospf 1 area 0 ip access-group ACL-DC-A in ip nat inside duplex auto speed auto ! interface GigabitEthernet0/0/1 ip address 10.1.2.2 255.255.255.0 ip ospf 1 area 0 ip nat inside duplex auto speed auto ! interface GigabitEthernet0/0/2 no ip address duplex auto speed auto ! interfaceSerial0/2/0 ip address 172.31.12.6 255.255.255.252 ip nat outside ! interface Serial0/2/1 no ip address clock rate 2000000 ! interface Vlan1 no ip address ! router ospf 1 router-id 1.1.1.2 log- adjacency-changes default- information originate ! ip nat inside source list 1 interface Serial0/2/0 overload ip classless ip route 0.0.0.0 0.0.0.0 172.31.12.5 115 ! ip flow-export version 9 ! ! access-list 1 permit 10.0.0.0 0.255.255.255 ip access-list extended ACL-DC-A permit tcp 10.4.0.0 0.0.255.255 201.10.10.0 0.0.0.31 eq www permit tcp 10.4.0.0 0.0.255.255 201.10.10.0 0.0.0.31 eq 443 deny ip 10.4.0.0 0.0.255.255 201.10.10.0 0.0.0.31

	permit ip any any !! line con 0 ! line aux 0 ! line vty 0 4 login ! ! ! end

SW_C1 - initial missing	**SW-C1 - final**
	! version 15.0 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname SW- C1 ! spanning-tree mode pvst spanning-tree extend system-id ! interface FastEthernet0/1 ! interface FastEthernet0/2 ! ! interface GigabitEthernet0/1 ! interface GigabitEthernet0/2 ! interface Vlan1 no ip address shutdown ! ! line con 0 ! line vty 0 4 login line vty 5 15 login ! end

SW-C2 - initial missing	**SW-C2 - final** version
	15.0

	no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname SW- C2 ! ! spanning-tree mode pvst spanning-tree extend system-id ! interface FastEthernet0/1 switchport access vlan 40 switchport mode access ! interface FastEthernet0/2 switchport access vlan 40 switchport mode access ! interface FastEthernet0/3 switchport access vlan 40 switchport mode access ! interface FastEthernet0/4 switchport access vlan 40 switchport mode access ! interface FastEthernet0/5 switchport access vlan 40 switchport mode access ! interface FastEthernet0/6 switchport access vlan 40 switchport mode access ! interface FastEthernet0/7 switchport access vlan 40 switchport mode access ! interface FastEthernet0/8 switchport access vlan 40 switchport mode access ! interface FastEthernet0/9 switchport access vlan 41 ! interface FastEthernet0/10 switchport access vlan 41 ! interface FastEthernet0/11 switchport access vlan 41 ! interface FastEthernet0/12 switchport access vlan 41 !

	interface FastEthernet0/13 switchport access vlan 41 ! interface FastEthernet0/14 switchport access vlan 41 ! interface FastEthernet0/15 switchport access vlan 41 ! interface FastEthernet0/16 switchport access vlan 41 ! interface FastEthernet0/17 switchport access vlan 42 ! interface FastEthernet0/18 switchport access vlan 42 ! interface FastEthernet0/19 switchport access vlan 42 ! interface FastEthernet0/20 switchport access vlan 42 ! interface FastEthernet0/21 switchport access vlan 42 ! interface FastEthernet0/22 switchport access vlan 42 ! interface FastEthernet0/23 switchport access vlan 42 ! interface FastEthernet0/24 switchport access vlan 42 ! interface GigabitEthernet0/1 switchport mode trunk ! interface GigabitEthernet0/2 ! interface Vlan1 no ip address shutdown ! ! line con 0 ! line vty 0 4 login line vty 5 15 login ! end

SW-DC - initial	**SW-DC - final !** version
Lack	15.0 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname SW- DC ! ! spanning-tree mode pvst spanning-tree extend system-id ! interface FastEthernet0/1 switchport access vlan 10 ! interface FastEthernet0/2 switchport access vlan 20 ! interface FastEthernet0/3 switchport access vlan 30 ! ! interface GigabitEthernet0/1 ! interface GigabitEthernet0/2 switchport mode trunk ! interface Vlan1 no ip address shutdown ! line con 0 ! line vty 0 4 login line vty 5 15 login ! ! end

SW-OD-A - initial	**SW-OD-A - final**
	! version 15.0 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname SW- OD-A

	! ! ip domain-namekonkurs.com ! username admin1 secret 5 1mERr$q.MA2tj.WFptzvbifq/ 1i. ! ! ! spanning-tree mode rapid-pvst spanning-tree extend system-id spanning-tree vlan 50,60 priority 24576 ! interface Port-channel1 switchport mode trunk ! interface FastEthernet0/1 switchport access vlan 50 ! ! interface FastEthernet0/23 switchport mode trunk channel-group 1 mode active ! interface FastEthernet0/24 switchport mode trunk channel-group 1 mode active ! interface GigabitEthernet0/1 switchport mode trunk ! interface GigabitEthernet0/2 switchport mode trunk ! interface Vlan1 no ip address shutdown ! interface Vlan50 ip address 10.4.50.252 255.255.255.0 ! ! line con 0 ! line vty 0 4 login local transport input ssh line vty 5 15 login local transport input ssh ! ! end

SW-OD-B - initial missing	**SW-OD-B - final !** version
	15.0 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname SW-OD- B ! ! spanning-tree mode rapid-pvst spanning-tree extend system-id ! interface FastEthernet0/1 switchport access vlan 60 ! ! interface GigabitEthernet0/1 switchport mode trunk ! interface GigabitEthernet0/2 switchport mode trunk ! interface Vlan1 no ip address shutdown ! interface Vlan50 ip address 10.4.50.253 255.255.255.0 ! ! line con 0 ! line vty 0 4 login line vty 5 15 login ! ! end

SW-OD-C - initial missing	**SW-OD-C - final**
	! version 15.0 no service timestamps log datetime msec no service timestamps debug datetime msec no service password-encryption ! hostname SW-OD- C !

	! spanning-tree mode rapid-pvst spanning-tree extend system-id ! interface Port-channel1 switchport mode trunk ! ! interface FastEthernet0/23 switchport mode trunk channel-group 1 mode active ! interface FastEthernet0/24 switchport mode trunk channel-group 1 mode active ! interface GigabitEthernet0/1 switchport mode trunk ! interface GigabitEthernet0/2 ! interface Vlan1 no ip address shutdown ! interface Vlan50 ip address 10.4.50.254 255.255.255.0 ! ! line con 0 ! line vty 0 4 login line vty 5 15 login ! ! end

Semi-final task

The problem part

Description of the situation

Company employees reported several network issues to a newly hired administrator. The new administrator attempted to resolve the issues, but they were unsuccessful. Furthermore, the IT Director noted that the new administrator's actions had escalated the issues. After determining that the administrator lacked the required competencies, he was fired and the services of an external network administrator were retained. As an employee of this administrator, your task is to identify and resolve the issues based on scant documentation and user reports.

- Document all your actions. • Demonstrate how to establish topology, configuration status, protocol status, connectivity, and In particular, the source of the problem is crucial for scoring this task. • After determining the probable cause, propose corrective actions and implement them. • If they are effective, archive the correct network device configuration using TFTP on the Management server. The configuration file name is the device name and the .cfg extension.

Note: Access network devices from PC3 or Management or Laptop1 via SSH (routers and switches) or HTTP (WR0). The username and password for all devices are **admin** and **cisco ,** respectively.

Report 1:

- PC0 has been replaced with a new unit. However, when connected, there is no access to networks.
- Objective: Solve the problem

Report 2:

- IOS update is scheduled on the Left 1 router. Since the Left1 and Left2 routers belong to the group HSRP was not afraid of disabling the Left1 router, assuming that the second router would act as the default gateway.
- After turning off the router, Server0 was unreachable. Left 1 was turned back on with no change.
- Goal: Improve HSRP before retrying to upgrade the Left1 router.

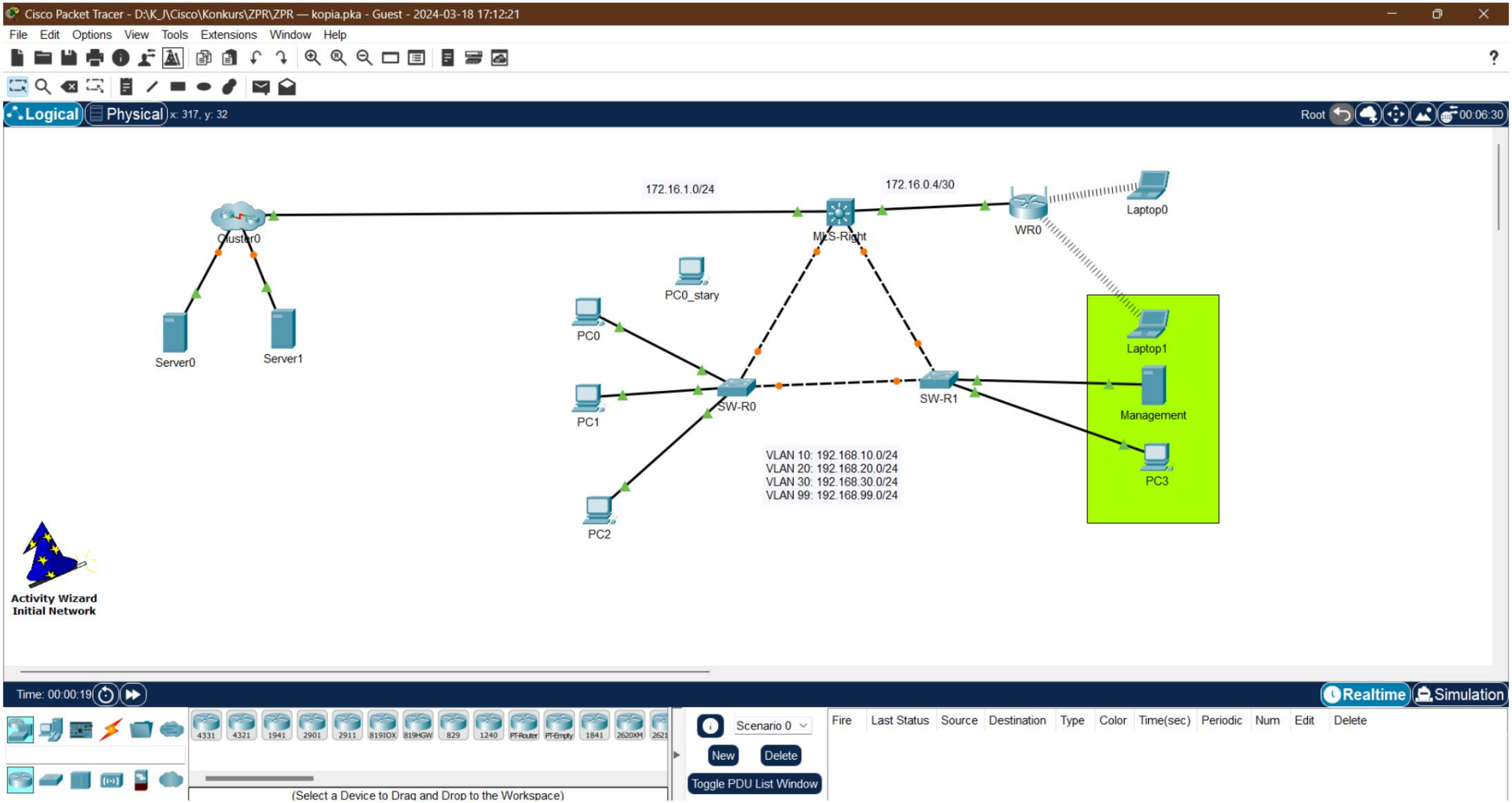
Report 3:

- The administrator cannot connect using ssh to the Left0 router from PC3, he must use the server Management
- Goal: Fix the problem. PC3 is the eleventh management unit and needs to have access to network devices.

Report 4:

- Wireless users (Laptop0 and Laptop1) report that they cannot access other networks.
- Objective: Restore connection

Topology of the problem task



Initial configurations of the problem task devices

```
! version 16.3.2 no
service timestamps log datetime msec no service timestamps debug
datetime msec no service password-encryption ! hostname MLS-
Right ! ! ! ip dhcp excluded-address 192.168.10.1

192.168.10.20 ip dhcp excluded-



address 192.168.20.1 192.168.20.20 ip dhcp excluded-address 192.168.30.1
192.168.30.20 ip dhcp excluded-address 192.168.99.1 192.168.99.20 ip dhcp excluded-
address 172.16.0.5 172.16.0.6 ! ip dhcp pool VLAN10_Pool network 192.168.10.0
255.255.255.0 default-router 192.168.10.1




ip dhcp pool VLAN20_Pool network
  192.168.20.0 255.255.255.0 default-router 192.168.20.1

ip dhcp pool VLAN30_Pool network
  192.168.30.0 255.255.255.0 default-router 192.168.30.1

ip dhcp pool VLAN99_Pool network
  192.168.99.0 255.255.255.0 default-router 192.168.99.1
  dns-server 192.168.99.2 ip dhcp pool WR0


  network 172.16.0.4 255.255.255.252 default-router
  172.16.0.5 ! ! ! no ip cef ip routing ! no ipv6



cef! ! username
admin privilege

15 secret 5


$1$mERr$hx5rVt7rPNoS4wqbXKX7m0 ! ! ip domain-name MLS-Right.konkurs.edu ! ! spanning-tree mode pvst ! !


interface GigabitEthernet1/0/1 no switchport ip address


172.16.1.2 255.255.255.0 ip ospf 1 area


0 duplex auto speed auto !
```

```
interface GigabitEthernet1/0/2 switchport trunk
  native vlan 99 switchport mode dynamic desirable !
  interface GigabitEthernet1/0/3 switchport trunk native

vlan 99 switchport mode dynamic desirable !
  interface GigabitEthernet1/0/4 no switchport ip
  address 172.16.0.5 255.255.255.252 ip ospf 1 area 0

duplex auto speed auto ! interface Vlan1 no ip
  address shutdown









! interface Vlan10 mac-
  address 00e0.f72a.4c01 ip address
  192.168.10.1 255.255.255.0 ! interface Vlan20 mac-address

00e0.f72a.4c02 ip address
  192.168.20.1 255.255.255.0 ! interfaceVlan30



  mac-address 00e0.f72a.4c03 ip address
  192.168.30.1 255.255.255.0 ! interfaceVlan99


  mac-address 00e0.f72a.4c04 ip address
  192.168.99.1 255.255.255.0 ! router ospf 1 router-id 1.1.200.1

log-adjacency-
  changes passive-interface
  GigabitEthernet1/0/4 network
  192.168.0.0 0.0.255.255 area 0


! ip classless! ip

flow-export version 9 ! ! line con 0 ! line


aux 0 ! line vty

0 4 login local

transport input ssh !
  end
```

```
!
```

```
version 15.0 no
service timestamps log datetime msec no service timestamps debug
datetime msec no service password-encryption ! hostname SW-R0 !
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0 !

username admin secret

5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0 ! spanning-tree mode pvst spanning-

tree extend system-id ! interface FastEthernet0/1




  switchport access vlan 10 switchport mode
  access switchport port-security
  switchport port-security mac-address
  sticky switchport port-security mac-address sticky 0007.ECE9.35BC
  spanning-tree portfast ! interface FastEthernet0/2 switchport access vlan 20 switchport mode access
  switchport port-security switchport

port-security mac-address sticky switchport
  port-security mac-address sticky
  0002.160D.0438 spanning-tree
  portfast ! interface FastEthernet0/3




  switchport access vlan 30 switchport mode
  access switchport port-security
  switchport port-security mac-address
  sticky switchport port-security mac-address sticky 0000.0CDC.AC59
  spanning-tree portfast ! interface FastEthernet0/4 switchport mode access switchport port-security
  switchport port-security mac-address

sticky spanning-tree portfast shutdown !
  interface FastEthernet0/5 switchport
  mode access switchport port-security
  switchport port-security mac-address sticky spanning-tree portfast
  shutdown ! interface FastEthernet0/6
  switchport

mode access switchport port-security
  switchport port-security mac-address
  sticky spanning-tree portfast shutdown !
```

interface FastEthernet0/7 switchport
mode access switchport port-security
switchport port-security mac-address
sticky spanning-tree portfast shutdown ! interface FastEthernet0/8
switchport mode access switchport
port-security

switchport port-security mac-address
sticky spanning-tree portfast
shutdown ! interface FastEthernet0/9
switchport mode access switchport port-security switchport port-security
mac-address sticky spanning-tree
portfast

shutdown ! interface FastEthernet0/10
switchport mode access switchport
port-security switchport port-security
mac-address sticky spanning-tree portfast shutdown ! interface
FastEthernet0/11 switchport mode
access

switchport port-security switchport port-
security mac-address sticky spanning-
tree portfast shutdown ! interface
FastEthernet0/12 switchport mode access switchport port-security
switchport port-security mac-address
sticky

spanning-tree portfast shutdown ! interface
FastEthernet0/13 switchport mode
access switchport port-security switchport
port-security mac-address sticky spanning-tree portfast shutdown !
interface FastEthernet0/14 switchport
mode access

switchport port-security switchport port-
security mac-address sticky spanning-
tree portfast shutdown ! interface
FastEthernet0/15 switchport mode access switchport port-security

switchport port-security mac-address sticky spanning-tree portfast
shutdown ! interface FastEthernet0/16
switchport

mode access switchport port-security
switchport port-security mac-address
sticky spanning-tree portfast shutdown !
interface FastEthernet0/17 switchport mode access switchport port-
security switchport port-security mac-
address

sticky spanning-tree portfast shutdown !
interface FastEthernet0/18 switchport
mode access switchport port-security
switchport port-security mac-address sticky spanning-tree portfast
shutdown ! interface FastEthernet0/19
switchport

mode access switchport port-security
switchport port-security mac-address
sticky spanning-tree portfast shutdown

! interface FastEthernet0/20 switchport
mode access switchport port-security
switchport port-security mac-address
sticky spanning-tree portfast shutdown

! interface FastEthernet0/21 switchport
mode access switchport port-security
switchport port-security mac-address
sticky spanning-tree portfast shutdown

! interface FastEthernet0/22 switchport
mode access switchport port-security
switchport port-security mac-address
sticky spanning-tree portfast shutdown

! interface FastEthernet0/23 switchport
mode access switchport port-security
switchport port-security mac-address
sticky spanning-tree portfast shutdown

```
! interface FastEthernet0/24 switchport mode
  access switchport port-security
  switchport port-security mac-address
  sticky spanning-tree portfast shutdown ! interface GigabitEthernet0/1
  switchport trunk native vlan 99 !
  interface

GigabitEthernet0/2 switchport trunk native vlan
  99 switchport mode dynamic desirable ! interface

Vlan1 no ip address shutdown




!
interface Vlan99
  ip address 192.168.99.21 255.255.255.0 ! ip default-gateway

192.168.99.1 ! line con 0 ! line vty 0 4 login local

transport input

ssh line vty 5 15
  login ! end
```

```
! version 15.0 no
service timestamps log datetime msec no service timestamps debug
datetime msec no service password-encryption ! hostname SW-R1 !
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0 !

username admin secret

5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0 ! spanning-tree mode pvst spanning-

tree extend system-id ! interface FastEthernet0/1




  switchport access vlan 99 spanning-tree
  portfast ! interface FastEthernet0/2


  switchport access vlan 99 spanning-tree
  portfast !
```

```
interface FastEthernet0/3 spanning-tree
  portfast shutdown ! interface


FastEthernet0/4 spanning-tree portfast
  shutdown ! interface FastEthernet0/5
  spanning-

tree portfast shutdown



! interface FastEthernet0/6 spanning-tree
  portfast shutdown


! interface FastEthernet0/7 spanning-tree
  portfast shutdown


! interface FastEthernet0/8 spanning-tree
  portfast shutdown ! interface


FastEthernet0/9 spanning-tree portfast
  shutdown ! interface FastEthernet0/10
  spanning-

tree portfast shutdown



! interface FastEthernet0/11 spanning-tree
  portfast shutdown


! interface FastEthernet0/12 spanning-tree
  portfast shutdown


! interface FastEthernet0/13 spanning-tree
  portfast shutdown


! interface FastEthernet0/14 spanning-tree
  portfast shutdown


! interface FastEthernet0/15 spanning-tree
  portfast shutdown ! interface


FastEthernet0/16 spanning-tree portfast
  shutdown ! interface FastEthernet0/17
  spanning-

tree portfast shutdown
```

```
! interface FastEthernet0/18 spanning-tree
  portfast shutdown


! interface FastEthernet0/19 spanning-tree
  portfast shutdown


! interface FastEthernet0/20 spanning-tree
  portfast shutdown


! interface FastEthernet0/21 spanning-tree
  portfast shutdown ! interface


FastEthernet0/22 spanning-tree portfast
  shutdown ! interface FastEthernet0/23
  spanning-

tree portfast shutdown ! interface
  FastEthernet0/24



  switchport trunk native vlan 99 switchport mode
  trunk ! interface GigabitEthernet0/1

switchport trunk native vlan 99 ! interface
  GigabitEthernet0/2 switchport trunk native vlan 99 !

interface Vlan1 no ip address shutdown




!
interface Vlan99
  ip address 192.168.99.22 255.255.255.0 ! ip default-gateway

192.168.99.1 ! ! line con 0 ! line vty 0 4 login local


transport input

ssh line vty 5 15
  login ! end
```

```
! version 15.4
```

no service timestamps log datetime msec no service timestamps
debug datetime msec no service password-encryption ! hostname
Central ! ! no ip cef no ipv6 cef ! username admin

privilege 15 secret 5

1mERr$hx5rVt7rPNoS4wqbXKX7m0 ! ! ip domain-name Central.konkurs.edu ! ! spanning-tree mode pvst ! !

interface GigabitEthernet0/0/0 ip address 172.16.1.1

255.255.255.0 ip ospf 1 area 0 duplex

auto speed auto ! interface GigabitEthernet0/0/1 no
ip address duplex auto speed auto shutdown ! interface
GigabitEthernet0/0/2 no ip
address duplex
auto speed auto

shutdown

!
interface Serial0/1/0
ip address 172.16.2.1 255.255.255.0 ip ospf 1 area 0 !
interface Serial0/1/1 no ip

address clock rate 2000000 shutdown

! interface Vlan1 no ip
address shutdown

! router ospf 1 router-
id 1.1.1.1 log-adjacency-
changes ! ip classless! ip flow-export

version 9 ! !

line con 0 ! line

aux 0 ! line vty 0

4 login local transport
input ssh ! ! ! end

! version 15.4 no
service timestamps log datetime msec no service timestamps debug
datetime msec no service password-encryption ! hostname Left0 ! ! no
ip cef no ipv6 cef ! ! username admin privilege 15

secret 5

1mERr$hx5rVt7rPNoS4wqbXKX7m0 ! ! ip domain-name Left0.konkurs.edu ! ! spanning-tree mode pvst ! interface

GigabitEthernet0/0/0 ip address 172.16.3.1

255.255.255.0 ip ospf 1 area 0 duplex

auto speed auto ! interface GigabitEthernet0/0/1 ip
address 172.16.4.1 255.255.255.0 ip ospf 1 area 0 duplex
auto speed auto ! interface
GigabitEthernet0/0/2
no ip address

duplex auto speed auto shutdown ! interfaceSerial0/1/0

ip address 172.16.2.2 255.255.255.0 ip ospf 1 area 0 ip
access-group 107 in clock
rate 2000000 !

```
interface Serial0/1/1 no ip address
 clock rate 2000000
 shutdown


! interface Serial0/2/0 no ip address
 clock rate 2000000
 shutdown


! interface Serial0/2/1 no ip address
 clock rate 2000000
 shutdown


! interface Vlan1 no ip
 address shutdown


! router ospf 1 router-
 id 1.1.100.1 log-adjacency-
 changes ! ip classless ip route

192.168.99.23
255.255.255.255 Null0 ! ip flow-export version 9 ! ! access-list 107 permit

tcp any 172.17.1.104 0.0.0.7 eq www


access-list 107 permit icmp any 172.17.1.104 0.0.0.7 access-list 107 deny ip any 172.17.1.104
0.0.0.7 access-list 107 permit ip any any ! ! line con 0 ! line aux 0 ! line vty 0 4 login
local transport input ssh ! ! ! end
```

```
! version 15.4 no
service timestamps log datetime msec no service timestamps
debug datetime msec no service password-encryption ! hostname
Left1 ! ip cef no ipv6 cef
```

! ! username admin privilege 15 secret 5 1mERr$hx5rVt7rPNoS4wqbXKX7m0 ! ! ip domain-name Left1.konkurs.edu ! !

spanning-tree mode pvst ! ! interface GigabitEthernet0/0/0

ip address 172.17.1.1 255.255.255.0 ip

ospf 1 area 0 duplex auto speed auto standby 1 ip
172.17.1.254 standby 1 priority 80 standby 1 preempt !
interface GigabitEthernet0/0/1
ip address
172.16.3.2
255.255.255.0 ip ospf 1 area 0 duplex auto
speed auto ! interface
GigabitEthernet0/0/2 no ip

address duplex auto speed auto shutdown

! interface Vlan1 no ip
address shutdown

! router ospf 1 router-
id 1.1.100.10 log-adjacency-
changes passive-interface
GigabitEthernet0/0/0 ! ip classless! ip flow-export version 9 ! ! line

con 0 ! line aux 0 !

line vty 0 4 login local transport input ssh !

end

!

version 15.4 no

service timestamps log datetime msec no service timestamps debug
datetime msec no service password-encryption ! hostname Left2 ! ! ip
cef no ipv6 cef ! ! username admin privilege 15

secret 5

1mERr$hx5rVt7rPNoS4wqbXKX7m0 ! ip domain-name Left2.konkurs.edu ! ! spanning-tree mode pvst ! ! interface

GigabitEthernet0/0/0 ip address 172.17.1.2

255.255.255.0 ip ospf 1 area 0 duplex

auto speed auto standby 1 ip 172.17.1.254 standby
1 preempt ! interface GigabitEthernet0/0/1 ip address
172.16.4.2 255.255.255.0
ip ospf 1 area 0
duplex auto
speed auto ! interface GigabitEthernet0/0/2
no ip address duplex auto

speed auto shutdown

! interface Vlan1 no ip
address shutdown

! router ospf 1 router-
id 1.1.100.20 log-adjacency-
changes passive-interface
GigabitEthernet0/0/0 ! ip classless! ip flow-export version 9 ! line

con 0 ! line aux 0 !

line vty 0 4 login local

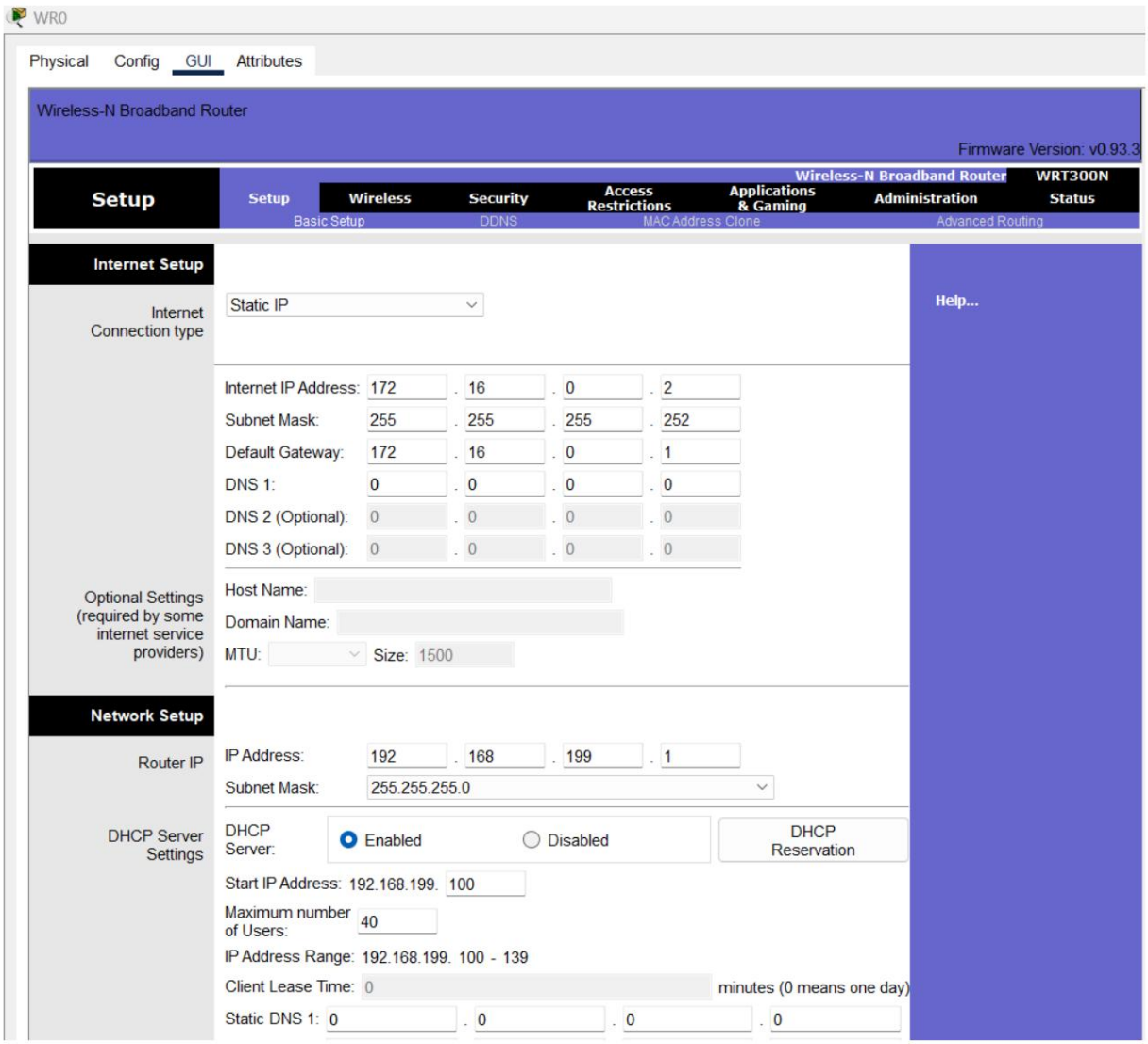
```
transport input ssh ! end
```

```
! version 15.0 no
service timestamps log datetime msec no service timestamps debug
datetime msec no service password-encryption ! hostname SW-L0 !
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0 ! !

ip domain-name SW-

L0.konkurs.edu ! username admin secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0 ! ! !


spanning-tree mode pvst spanning-tree extend system-

id ! ! interfaceVlan1









  ip address 172.17.1.252 255.255.255.0 ! ip default-gateway

172.17.1.254 ! ! line con 0 ! line vty 0 4 login local


transport input

ssh line vty 5 15
  login ! end
```

```
! version 15.0 no
service timestamps log datetime msec no service timestamps debug
datetime msec no service password-encryption ! hostname SW-L1 !
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0 ! !

ip domain-name SW-

L1.konkurs.edu ! username admin secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
```

```
! ! spanning-tree mode pvst spanning-
tree extend system-id ! ! interface GigabitEthernet0/2


switchport access vlan 11 ! interfaceVlan1



  ip address 172.17.1.253 255.255.255.0 ! ip default-gateway

172.17.1.254 ! line con 0 ! line vty 0 4 login local

transport input

ssh line vty 5 15
  login ! end
```

WR0



Problems - solution

Assessment Items	Points	Component(s)	Feedback When Incorrect
Network			
MLS-Right			
DHCP Server			
Excluded Addresses			
172.16.0.5: 172.16.0.5	1	Ip	
Management			
TFTP Server			
ServerFiles			
Left0.cfg: tftp:/Left0.cfg	1	Ip	
MLS-Right.cfg: tftp:/MLS-Right.cfg	1	Ip	
SW-L1.cfg: tftp:/SW-L1.cfg	1	Ip	
SW-R0.cfg: tftp:/SW-R0.cfg	1	Ip	
SW-L1			
Ports			
GigabitEthernet0/2			
Access VLAN: 1	1	Switching	
SW-R0			
Ports			
FastEthernet0/1			
Port Security			
Sticky MACs			
0001.6473.3BC3: 0001.6473.3BC3	1	Other	
Port Status: 1	1	Physical	
Port Up: 1	1	Physical	
Server1			
Default Gateway: 172.17.1.254	1	Ip	
WR0			
Ports			
Internet			
DHCP client enable: 1	1	Ip	