

WorldSkills Germany Test Project

IT Network Systems Administration (39) Module C – Networking

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Introduction to Test Project

Contents

This Test Project proposal consists of the following documentations/files:

- 1. WSG2025_TP39_MC_en.pdf
- 2. WSG2025_TP39_MC_Configuration.pka
- 3. WSG2025_TP39_MC_Troublesshoot.pka

Introduction

Network technology knowledge is becoming essential nowadays for people who want to build a successful career in any IT engineering field. This test project contains a lot of challenges from real life experience, primarily IT integration and IT outsourcing. If you are able to complete this project with the high score, you are definitely ready to service the network infrastructure.

Description of project and tasks

Data Transfer Networks

As the network administrator, your task is to set up the new location in Weilburg. The routers and switches have been installed and cabled; now it is time to configure the devices. All switches and routers in Weilburg can be accessed via a serial console.

The site is connected to the corporate network via two WAN routers, WeilW1 and WeilW2. The site has internet access via the same two WAN routers.

IPv4 is used in the production network at this location. The WAN administrators have already configured the IP addresses for the interfaces towards Corporate and ISP.

It was decided at the Weilburg site that the access switches should be routed so that the broadcast domains remain small.

For redundancy and performance reasons, an L3 EtherChannel will be created from each access switch to the WAN routers.

VLANs are transported between the two access switches via an L2 EtherChannel.

Data traffic for the VLANs on the access switches will be distributed to the two switches via HSRP.

The WLAN access points, DNS, and DHCP servers have been preconfigured and are ready for use.

OSPF will be configured as the routing protocol. The Weilburg site will be Area 0, and the corporate network will be Area 2. The two WAN routers serve as area border routers. OSPF has already been configured in the corporate network.

Instructions to the Competitor

The competition has fixed start and finish times. You must decide how to best allocate your time.

Do not bring any materials to the competition. Mobile phones are not permitted.



Do not disclose any competition materials or information to anyone during the competition. Read the entire competition script before starting work.

Tasks are processed with the Cisco Packet Tracer. Save your router and switch configurations, as well as the Packet Tracer Lab itself, at the end of each task.

It is also best to regularly save the lab to ensure that your configurations are not lost in the event of a software problem.

Plan your time carefully.

1. TASK Configuration

BASIC CONFIGURATION Routers & Switches Weil_A1, Weil_A2, Weil_C1, Weil_W1, Weil_W2

Hostname + Mgmt IP via Loopback Interface

Weil_A1	-	Loopback1	-	10.10.111.2/32
Weil_A2	-	Loopback1	-	10.10.111.3/32
Weil_C1	-	Loopback1	-	10.10.111.1/32
Weil_W1	-	Loopback1	-	10.10.111.4/32
Weil_W2	-	Loopback1	-	10.10.111.5/32

User + Password (Console+SSH) --> User:"weiladmin" Password "weilwsk".

Only SSH connect --> Version 2 , line 0-15, local user.

Enable Secret Password --> "weilena".

activate service "password encryption"

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Banner Message of the Day --> "Unauthorized Access is Strictly Prohibited"
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Domain Name --> "skill39.org"

1.1. QUICK SPECIFICATIONS

Transfer Networks ISP/Corporate:

172.20.20.0/30	WeilW1 <> Corporate
172.20.20.4/30	WeilW2 <> Corporate
195.198.11.0/30	WeilW1 <> ISP
195.198.11.4/30	WeilW2 <> ISP

Network Site Weilburg LAN:

10.11.1.0/30	WeilA1 <> WeilC1
10.11.2.0/30	WeilA2 <> WeilC1
10.11.3.0/30	WeilC1 <> WeilW1
10.11.4.0/30	WeilC1 <> WeilW2



Network	VLAN	Name
10.10.2.0/27	2	HR
10.10.4.0/28	4	SALES
10.10.6.0/26	6	ENGINEERING
10.10.8.0/29	8	WLAN
10.10.130.0/29	130	Server

DNS and DHCP servers are already configured

The DNS server IP is 10.10.130.3 und the DHCP server IP is 10.10.130.2

The Access Points are in VLAN 8, Interface 1/0/21 on the access switches





Your task is to configure all the routers and switches in Weilburg.

Check to see if they are configured correctly. The www.google.de and https://192.168.66.200 pages must be accessible to confirm that Internet and Intranet access has been configured correctly.

1.2. Configuration VLAN & Trunk

VLAN Weil_A1&WeilA2:

Network	VLAN	Name	Interface g1/0/X
10.10.2.0/27	2	HR	3-8
10.10.4.0/28	4	SALES	9-16
10.10.6.0/26	6	ENGINEERING	17-20
10.10.8.0/29	8	WLAN	21-22
eil_C1:			

VLAN Weil_C1:

Network	VLAN	Name	Interface g1/0/X
10.10.130.0/29	130	SERVER	3-20

Trunk configuration:

Configure an IEEE 802.1Q trunk between WeilA1 and WeilA2

Native VLAN 10

Only VLAN 2,4,6 and 8 should be transported via the trunk

Create L3 SVI interfaces:

SVI interfaces for VLAN 2,4,6,8 on the access switches SVI interface for VLAN 130 on the core switch

Use the following IP addresses for the interfaces: Weil_A1 – second-to-last usable IP of a subnet Weil_A2 – third-to-last usable IP of a subnet Weil_C1 - last usable IP address in the subnet

1.3. Routed Interfaces Core Switch

For the connections from the core switch to the WAN routers, uses routed L3 interfaces (g1/0/1 and g1/0/2) on the core switch.

Use the first usable IP of a subnet

1.4. Uplink & Access Ports

All interfaces on the switches to which end devices can be connected should be configured as fixed access ports o prevent the establishment of trunks. The uplinks to other switches should be permanently configured as trunk ports.

Use LACP as the protocol for the L2 and the L3 EtherChannel between the switches.



1.5. Spanning – Tree

We use the 802.1w STP standard on all switches.

All access ports use the STP feature PortFast.

BPDU packets should be prevented from being accepted on the access ports. If this rule is violated, the affected port should be shut down.

These two features should be configured directly on the access ports interfaces and not globally.

Use the root primary and secondary configuration parameters to set the root bridge.

Weil_A1 – root primary Weil_A2 – root secondary

1.6. Redundancy Default-Gateway HSRP Protocol

The two L3 switches Weil_A1 and Weil_A2 provide a virtual default gateway for the LAN Access Networks. The virtual IP address for the redundant default gateway for the VLAN networks, should be the last IP address from the given subnet.

Use the same HSRP group number, as the VLAN numbers.

Switch Weil_A1 should be "Active" for the networks VLAN 2 and VLAN 4, and switch Weil_A2 switch should be "Active" for VLAN 6 and VLAN 8

Weil_A1 – VLAN 2 and 4 – active	– Priority 105
Weil_A1 – VLAN 6 and 8 – standby	– Priority 100
Weil_A2 – VLAN 2 und 4 – standby	– Priority 100
Weil_A2 – VLAN 6 und 8 – active	– Priority 105

After an active router fails, it should become active again once it is functional. Use HSRP version 1, and use the physical port-channel interfaces as the track interface to core switch.

1.7. DHCPv4 Server

The DHCP server has already been configured by the server administrator for VLANs 2, 4, 6 and 8. Remember to configure the appropriate DHCP Relay Agent on the default gateway interfaces.

DHCP Server IP:10.10.130.2

1.8. IPv4 WAN Router Connections

IP configuration as specified under QUICK SPECIFICATIONS The Weil_W1 router's connection to the ISP is faster than the Weil_W2 router's. Use the "bandwidth" command to set the bandwidth specified under QUICK SPECIFICATIONS.

1.9. Routing IPv4 OSPF

All routing instances at the Weilburg site are in backbone area 0. The two WAN routers serve as area border routers to area 2 of the corporate network.

Configure OSPF on all Weilburg routing instances required with the following specifications:

0	Router-ID: -	Weil_A1 - 1.1.1.1
		Weil_A2 - 2.2.2.2
		Weil C1 - 3.3.3.3



Weil_W1 - 4.4.4.4 Weil_W2 - 5.5.5.5

- OSPF Process ID is "1"
- o All interfaces belong to Area 0, except the two WAN interfaces to the corporate network.
- The assignment of the interfaces to their respective areas should be done in the OSPF process using the "network" command. Use the IP address of the interface with the wildcard "0.0.0.0" in the network command.
- The required "default routes" should also be distributed to the interfaces in the OSPF area using the OSPF protocol.
- \circ ~ The default route should be configured by specifying the next hop IP address.
- To prevent routing information from being distributed via the access ports. No OSPF updates should be distributed to the VLAN networks 2,4,6, and 8.

1.10. Internet Access dynamic NAT/PAT

The two WAN interfaces connected to the ISP are already configured with a public IP.

Your task is to configure a dynamic NAT so that all end devices from the VLANs used in Weilburg have access to the internet.

Create a "Named Standard Access List" named "vlans" that allows all VLAN networks to access the internet. All end devices should be able to access the Internet simultaneously via the public IP address of the WAN interface connected the ISP.

1.11. Security

Port Security:

Port security should only be activated on the access switches.

Only one MAC address should be allowed per port, except for the interface to which the WLAN devices are connected, where a maximum of 50 MAC addresses should be allowed. If this rule is violated, the affected interface should switch to "protect" status.

IPv4 Access Lists:

SSH access to the devices in Weilburg:

Only end devices from the server VLAN should have SSH access. Create a standard numbered access list with the number 1 and bind to the corresponding line interfaces. Telnet should not be allowed

Intranet:

Create an extended access list named "intranet", in which access for everyone to the intranet server is only allowed via HTTPS and prohibited via HTTP. Allow all other data traffic.

Place the access list on both WAN routers so that the data traffic can be checked as early as possible



2. TASK Troubleshoot

After a hacker attack, many configurations were changed or deleted Your task is to regain access to the servers as quickly as possible. All PCs and servers must be able to connect to each other and to the external server over the internet using ICMP (IPv4 ping).

The password for all routers and switches is: worldsk

Fortunately, the IP address ranges in the topology diagram are still available and correct. Unfortunately, all other network documentation has been deleted, so you will need to determine the IP addresses of some devices yourself.





3. APPENDIX TASK Configuration

Specifications

I. Mgmt IP & Hostname

Management Network: 10.10.111.0/28

WeilA1	Loopback1	10.10.111.2
WeilA2	Loopback1	10.10.111.3
WeilC1	Loopback1	10.10.111.1
WeilW1	Loopback1	10.10.111.4
WeilW2	Loopback1	10.10.111.5

II. VLAN Table

VLAN WeilA1, WeilA2:

VLAN	Name
2	HR
4	SALES
6	ENGINEERING
8	WLAN
10	Native

VLAN WeilC1:

VLAN Name 130 Server

III. User & Passwords

Enable Secret password: weilena Local User: weiladmin Password: weilwsk



IV. Interface IP's

WeilA1

Po2 - 10.11.1.2/30 Lo1 - 10.10.111.2/32 IP configuration of the VLAN interfaces as specified

WeilA2

Po2 - 10.11.2.2/30 Lo1 - 10.10.111.3/32 IP configuration of the VLAN interfaces as specified

WeilC1

PO1 - 10.11.1.1/30 PO2 - 10.11.2.1/30 LO1 - 10.10.111.1/32 G1/0/1 - 10.11.3.1/30 G1/0/2 - 10.11.4.1/30 VLAN130 10.10.130.6/29

WeilW1

Lo1 - 10.10.111.4/32 G0/0/0 - 10.11.3.2/30 S0/1/0 - 195.198.11.1/30 Bandwith: 10000 s0/2/0 - 172.20.20.1/30 Bandwith: 5000

WeilW2

Lo1 - 10.10.111.5/32 G0/0/0 - 10.11.4.2/30 S0/1/0 - 195.198.11.5/30 s0/2/0 - 172.20.20.5/30

V. OSPF

OSPFv2 Area 0 Router-ID:

Weil_A1 1.1.1.1 Weil_A2 2.2.2.2 Weil_C1 3.3.3.3 Weil_W1 4.4.4.4 Weil_W2 5.5.5.5 Syntax network command "network ´IP Address Interface´´wildcard´ area ´ID´