

V17 Administration and Management of Network Systems



Module n°1: Installation and configuration of a company network.

Duration: 3 hours

Explanatory notes

Contestants will have the following equipment at their disposal:

Equipment	Specifications
Computer: PC1	OS Windows 7, 22 inch screen, Azerty Keyboard, optical mouse
Router: R1	Cisco Small Business RV 320
Computer : PC2	OS Windows 7, 19 inch screen, Azerty Keyboard, optical mouse, audio headset
IP phone: Phone1	Cisco SPA921
OS and Software	Specifications
Oracle VM VirtualBox	Virtualization software – Version 5.0.10
Windows 2012 server	Company server
Softphone	Telephone software for PC
Trixbox	Telephony server for PC - version trixbox-2.8.0.4.iso
Debian	Linux server – version debian-8.2.0-amd64-DVD-1.iso

All software and operating systems will be installed in their English versions.

If they wish so, contestants may use an adapted keyboard and/or mouse under condition of approval from the jury.

Important:

Configuration values for network interfaces or the means to determine them will be provided on the day of the competition. This also applies to the features configured on the various equipment.

Presentation of the company “Abilympics 2016”

The company network of the “Abilympics 2016” company provides various services to its employees: Web server, FTP server, IP telephony, messaging service, file sharing.

A “Windows 2012” server handles the management of the equipment and of the 6 user accounts (AD and DNS, rights...). Users each have a roaming profile stored on that server. This server will host a website, a messaging server and an FTP server.

A “Trixbox” telephony server will provide internal IP telephony services to the company. A welcome message and a voicemail will be configured in case of an absence of the speaker.

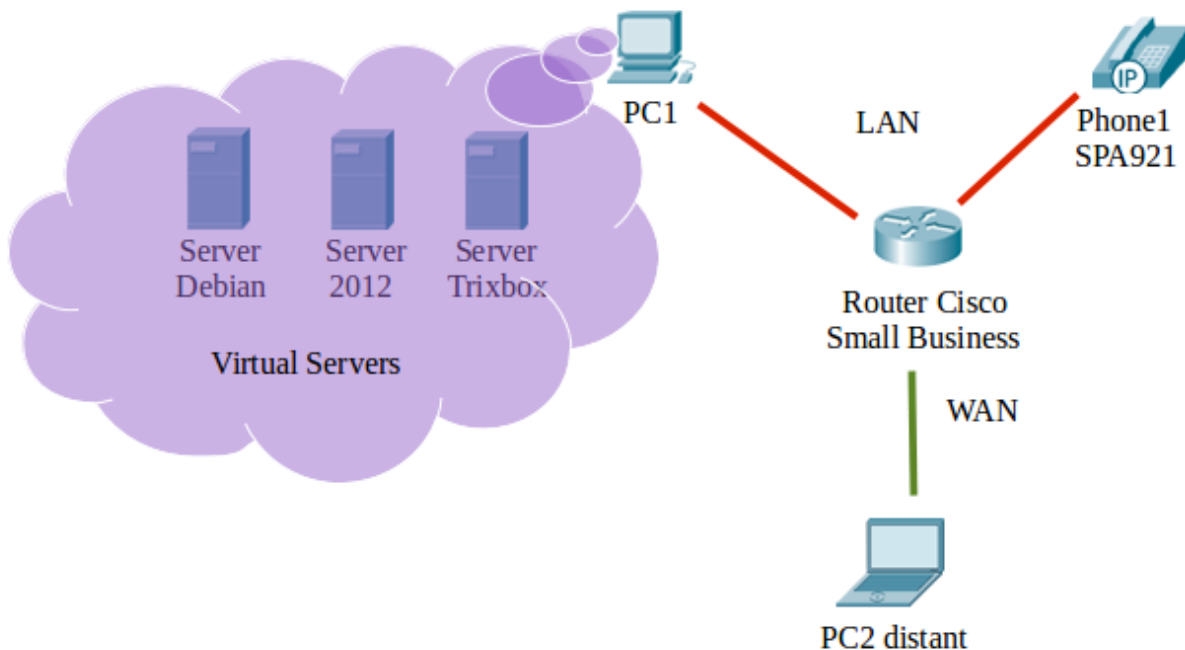
A “Debian” server will provide the dynamic network configurations to the IP phone (for which address reservation will be configured). This server will offer file sharing services and will host an FTP server. It can be synchronized with the “Windows 2012” server for user management.

The CISCO Small Business router will handle data transport between the WAN and LAN networks. A VPN tunnel is set up between PC2 and the router.

The Final Task is divided into 6 parts. Contestants must complete part 1 and have it validated as a priority. However, they are free to complete parts 2, 3, 4, 5 and 6 in the order of the choosing.

The diagram below represents the network that contestants will have to wire and configure on the day of the competition.

Diagram



Configuration values for network interfaces will be provided on the day of the competition. The LAN network is a class C network. The WAN network address is a public classless addressing, so as to limit the number of addresses used.

Part n°1: Installation preparation

- 1- Complete the cabling of the installation according to the presentation network diagram.
- 2- Configure the 2 PCs in static IP.
- 3- Check the proper functioning of the virtual equipment and the hardware configurations before any software configuration.
- 4- Check that the CISCO router and the IP phone are properly reset to factory settings.
- 5- Complete the answers document and have it validated by a member of the jury.

Indications for tasks to perform are provided for information purposes only and do not constitute a specific order in which to complete these tasks.

Part n°2: “Windows 2012” server configuration

- 1- Install the Active Directory and the DNS server. The domain name to be used is: abilympics2012.fr.
- 2- Create the 6 user accounts and define their respective rights.
- 3- Create user groups, Organizational units.
- 4- Install the IIS service in order to host the website. Configure the FTP server as well so as to offer access to information files.
- 5- Configure the messaging server. Each user must have a mail box at their disposal.

Indications for tasks to perform are provided for information purposes only and do not constitute a specific order in which to complete these tasks.

Part n°3: “Debian” server configuration

- 1- Include the “Debian” server into the Active Directory of the “Windows 2012” server.
- 2- “Recover” users from the Active Directory in order to create user for the “Debian” server. If users are created directly on the “Debian” server, the contestant will suffer a penalty and will only obtain part of the points allocated to this configuration.
- 3- Install the DHCP server. The server must provide the configurations for user stations and IP phones in the company.
- 4- Install the FTP server. The FTP server must allow information downloading but also the uploading of work documents.
- 5- Configure file and folder sharing within the company by installing the Samba server.

Indications for tasks to perform are provided for information purposes only and do not constitute a specific order in which to complete these tasks.

Part n°4: “Trixbox” server configuration

- 1- Configure SIP accounts on the “Trixbox” server.
- 2- Configure the welcome message and the voicemail service in case of absence.

Indications for tasks to perform are provided for information purposes only and do not constitute a specific order in which to complete these tasks.

Part n°5: Router and PC2 configurations

- 1- Configuration of the LAN network: the DHCP server is deactivated. The network configuration interface is static.
- 2- WAN network configuration: the router and PC2 WAN interfaces configuration is static.
- 3- VPN tunnel configuration: the router is configured as a VPN server and the PC2 station as a VPN client.
- 4- Access to LAN network servers: from the PC2 station (WAN side), users must be able to log into their personal accounts and access their roaming profiles. They must have access to all of the provided services from the three servers in the LAN network.

Part n°6: Functional testing

- 1- Each contestant must perform the tests specified in the testing sheet in order to ensure proper functioning of the entire installation. These tests will focus on the configuration of the LAN network and must validate or not the possibility for a user to have access to all of the provided services from the three servers in the LAN network through the VPN tunnel.
- 2- The jury will verify the conformity of the test results with the configuration checks they may perform at the end of the contest.

N°	Evaluation criteria	Scoring scale
Preparation of the installation		
01	Cabling conform to the schematics	1
02	Exact configuration of the static IP for both PCs	1
03	Proper functioning and exact configuration of the virtual machines	1
04	Exact filling out of the parameterization table	2
"Windows 2012" server configuration		
05	Correct installation of the Active Directory and of the DNS server	2
06	Presence of the 6 user accounts	1
07	Definition of user rights for all 6 users	1
08	Creation of user groups	2
09	Creation of organizational units	1
10	Correct installation of IIS, website	1
11	Correct configuration of the FTP server	1
12	Correct configuration of the mail server	1
13	Correct configuration of the Users mailbox	1
"Debian" server configuration		
14	Correct integration of the server in the AD	2
15	Users recovery in the AD	2



Module n°2:
Simulation of a WAN network interconnecting 4 LAN sites

Duration: 3 hours

Explanatory notes

Contestants will have desk computers with Windows 7 at their disposal, as well as the software Packet Tracer 6.2.0.0052 and open source office software applications. All software and operating systems will be installed in their English version.

The task requires the use of a software to simulate a computer installation. Contestants must remember to save their work regularly as well as creating save files.

If they wish so, contestants may use an adapted keyboard and/or mouse under condition of approval from the jury.

Contestants will have a 22 inch screen at their disposal.

The automatic evaluation of the configuration part of the task allows the contestants to follow the evolution of their work in real time. It requires that contestants respect the designation and name of the various equipment.

The percentage of success will determine the rating out of 40 allocated to this part of the task assignment.

The testing part will be rated out of 10 by members of the jury.

Important:

Configuration values for network interfaces or the means to determine them will be provided on the day of the competition. This also applies to the features configured on the various equipment.

16	Correct installation of the DHCP server	3
17	Correct installation of the FTP server	2
18	Correct configuration of file and folder sharing	2
"Trixbox" server configuration		
19	Correct configuration of the SIP accounts	3
20	Configuration of the welcome message	2
21	Configuration of the answering machine	2
22	Configuration of the LAN network	1
23	Configuration of the WAN network	1
24	Configuration of the VPN tunnel	1
25	Access to the servers in the LAN network: Windows 2012 server	1
26	Access to the servers in the LAN network: Debian server	1
27	Access to the servers in the LAN network: Trixbox server	1
Functional testing		
28	Filling out of the test file	3
29	Conformity of the test file according to the configurations tested by the jury	7
TOTAL POINTS FOR MODULE N°1		50



Abi wishes you a good competition!



Module n°2:
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Presentation of the network “Abilympics 2016”

The “Abilympics 2016” network allows the interconnection of 4 sites (designated hub 1 to hub 4). The task consists in configuring each hub as well as the routers used for interconnection.

The diagram simulates the interconnection of 4 company networks (LAN) interconnected through an “Internet network” (WAN) composed of 4 routers. Contestants will also configure the rules of communication between the different hubs allowing access to some services provided by the 4 servers.

Contestants must respect the specifications and complete the diagram of the network and perform the configuration of the various elements. They must validate the exactness of their configuration by performing the appropriate tests.

- The WAN network is composed of CISCO routers interconnected via optical fiber. The WAN network uses public addresses.
- The LAN network is composed of a server, two desk computers and a laptop (connected via Wi-Fi), and a Wi-Fi router (Linksys). A CISCO switch splits the local network into 4 VLANs.
- The various LAN networks are interconnected to the WAN network through the Fastethernet interface of the router (RJ45 connector). The LAN networks use private IP addresses.
- Inter-VLAN routing protocols must be defined in order to allow or deny communication between the various VLANs.
- Contestants will have to establish Access-lists depending on networks and protocols.
- All of the addressing will be configured on the various equipment using CLASSLESS addressing.
- Evaluation of the configuration will be performed automatically. A percentage of success will be displayed continuously.
- Once the configuration has been completed, contestants will carry out tests to make sure the system functions properly. The testing part of the task will be evaluated by members of the jury. Each contestant must perform imposed tests in order to validate the proper functioning of the WAN network, the access to the various hubs and the configuration of the various equipment.
- A simulation file containing an incomplete and partially configured diagram will be provided to each contestant. This file may contain configuration errors.

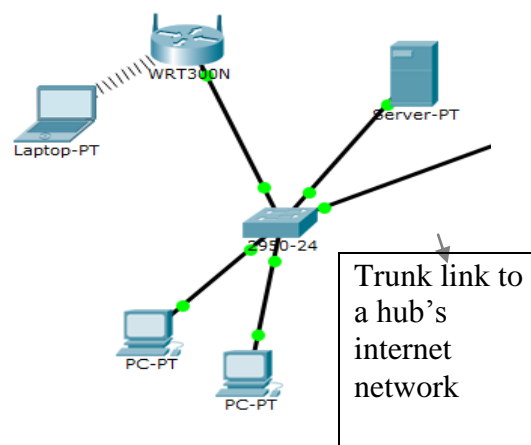
Part n°1: Configuration

Installation of components completing the diagram and configuration of the various equipment according to the following specifications:

1-1 Physical installation of hub equipment

Each hub is composed of the elements specified in the following chart:

Nbr	Designation	Packet Tracer templates
1	Wireless router	WRT300N
1	Commuter	2950-24
2	Generic PC	PC-PT
1	Server	Server-PT
1	Laptop	Laptop-PT



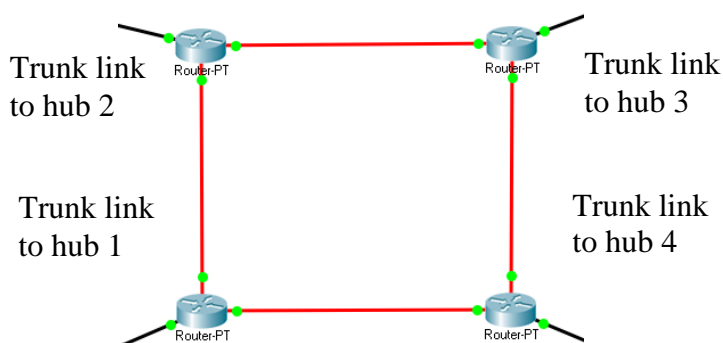
Installation diagram of a hub

It is important to respect the choice of equipment as defined in the above chart to ensure proper functioning of the simulation and of the automatic evaluation process.

1-2 Interconnection of the 4 companies – "Internet network"

The 4 routers must be interconnected via optical fiber. Connections to the various hubs are established through the Fastethernet 0/0 interfaces.

Designation of the routers to be used:
Router-PT



"Internet network" installation diagram

1-3 Division of the various networks into physical VLANs (VLAN per port)

VLAN 1 (Default VLAN) is the basic VLAN, it is not used.

VLAN 10 is reserved for the hub's server.

VLAN 20 allows the interconnection of the administration's PCs.

VLAN 30 allows the interconnection of user PCs.

VLAN 40 allows the interconnection of visitor laptops through a Wi-Fi router.

A Trunk link combining VLANs 10, 20, 30 and 40 ensures connection to the hub's CISCO router and thus allows access to the "Internet network".

Distribution of the switch's ports between the different VLANs (for all hubs):

VLAN 10 (ports 1, 2 and 3) → Server connected to port 1

VLAN 20 (ports 8, 9 and 10) → PC1 connected to port 8

VLAN 30 (ports (11 to 16) → PC2 connected to port 12

VLAN 1 (ports 4, 5, 6, 7, 17, 18, 19, 21, 22 and 23) →unused, the ports are deactivated.

VLAN 40 (ports 20) →Wi-Fi router

Port 24 is configured as a Trunk link.

1-4 Each hub's equipment must be configured according to the following constraints (the letter N is to be replaced with hub number from 1 to 4):

The IP addresses of cabled and wireless LAN networks are private Class C.

The desk computers and the laptop are configured in automatic addressing. The desk computers take their network configuration from their hub's CISCO router. The laptop gets its IP address from the Wi-Fi router WRT300N.

The hub's server is configured in static addressing. It will be accessible from the other hubs according to the firewall and port forwarding rules implemented on the CISCO routers in the "Internet network" and on the hub's WRT300N Wi-Fi router.

The WRT300N Wi-Fi router provides a secure Wi-Fi connection, but only to the hub's laptop. Any other Wi-Fi connection will be prohibited.

1-5 Each CISCO router in the Internet network must be configured according to the following constraints:

The optical fiber interfaces on the routers belong to the "Internet network". Their public IP addresses are Class A. In order to minimize the number of addresses used, the addressing will employ the CLASSLESS system, although not necessarily in an optimal way so as to simulate an access provider's address pools.

The following features may be implemented according to the requirements of the final task assignment: DHCP, NAT, filtering (Access list), port forwarding.

Routing tables may be defined as either static or dynamic (RIPv2 or OSPF protocols).

Routing tables for the hub's LAN network:

Equipment requiring a gateway		Fastethernet 0.0 interface of the CISCO router "Internet network" - Router sub-interfaces (gateways)	
Network hosts	@ IP	Network hosts	@ IP
Server_PN		→ Sub-interface 0.01	
PC1_PN	Auto (DHCP)	→ Sub-interface 0.02	
PC2_PN	Auto (DHCP)	→ Sub-interface 0.03	
Router_wifi (WAN)		→ Sub-interface 0.04	
The Server_PN is used as a DNS server within its hub			

Configuration tables for Wi-Fi routers in hubs

LAN network addressing table (visitor laptop connection)			
Network hosts	@IP	Network hosts	@IP
Router_wifi (Lan)		Laptop (visitor)	Auto (DHCP)
DHCP server configuration table			
DHCP server	Enable	Start IP address	
Maximum number	10	Static DNS 1	
WAN network configuration table			
Static IP	Configuration specified in a previous table		
Wi-Fi connection configuration table			
Network Mode	Mixed	SSID	Wifi-poleN
Radio Band	Auto	Wide Channel	Auto
Standard Channel			
Hub 1 → 1	Hub 2 → 4	Hub 3 → 8	Hub 4 → 11
SSID broadcast	Enable		
Security mode	WPA Personal	Encryption	TKIP
Key Renewal	33600	Passphrase	abilympics2016PN

Equipment requiring a gateway		Fastethernet 0.0 interface of the CISCO router "Internet network" - Router sub-interfaces (gateways)	
Router_P1 S0.0 (S2.0)		Router_P3 S0.0 (S2.0)	
Router_P1 S0.1 (S3.0)		Router_P3 S0.1 (S3.0)	
Router_P2 S0.0 (S2.0)		Router_P4 S0.0 (S2.0)	
Router_P2 S0.1(S3.0)		Router_P4 S0.1 (S3.0)	

Part n°2 – Functional testing

For this second part, functional testing shall be performed. These tests performed from a hub must check the proper functioning of the WAN network, the access to the various routers and the configurations of the different elements.

The testing is mandatory for the completion of the task; a testing sheet will be provided to contestants, who must complete it and hand it back at the end of the contest.

N°	Evaluation criteria	Scoring scale
30	Packet Tracer automatic evaluation survey	40
31	Completion of the imposed tests on the WAN network	3
32	Completion of the imposed tests for access to the various hubs	3
33	Coherence of the tests performed by the contestant	4
TOTAL POINTS for MODULE 2		50



Abi wishes you a good competition!