Computer Networks

Network design project

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Assignment

Design a configure a corporate network connected to the Internet. Verify, test and submit your solution in parts either via the Distributed Virtual Networking Laboratory (Virtlab) or electronically to an E-mail address given to you by your lab assistant backing up the functionality by supplying requested information.

Parametrization: Moravec-EN-VN_3

Domain: ahsoo
Topology ID: C
VLAN numbers: VLAN A=68, VLAN B=92, VLAN C=116
Stations on segments: VLAN A=52, VLAN C=170
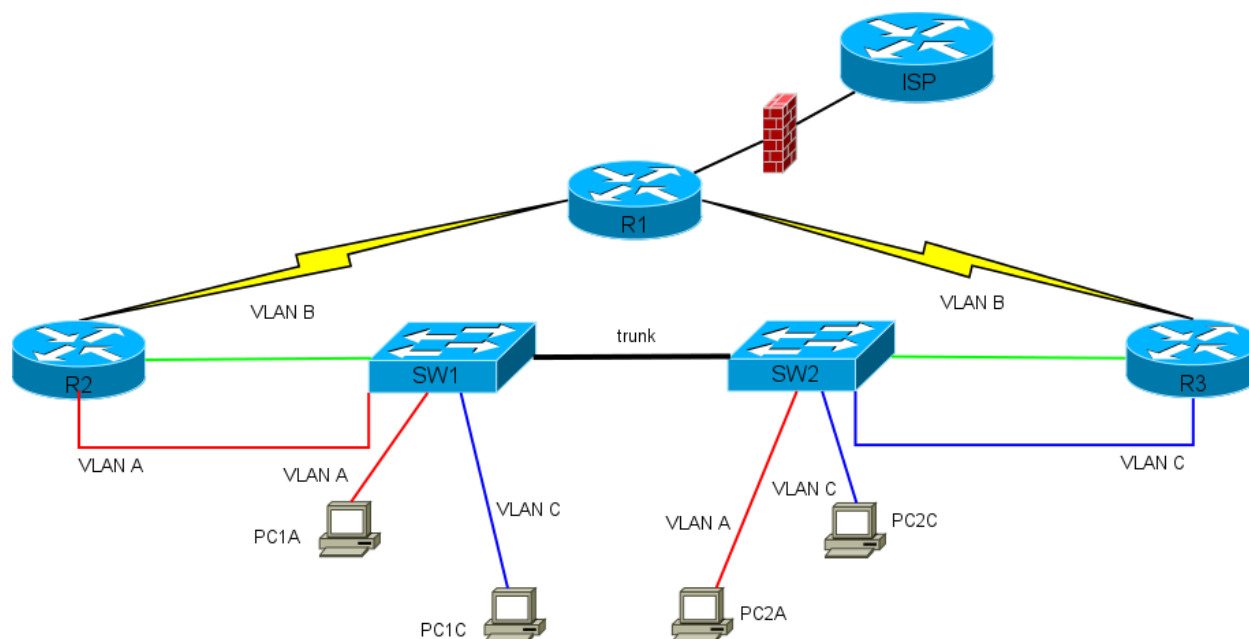Public prefix: 81.145.192.0/18
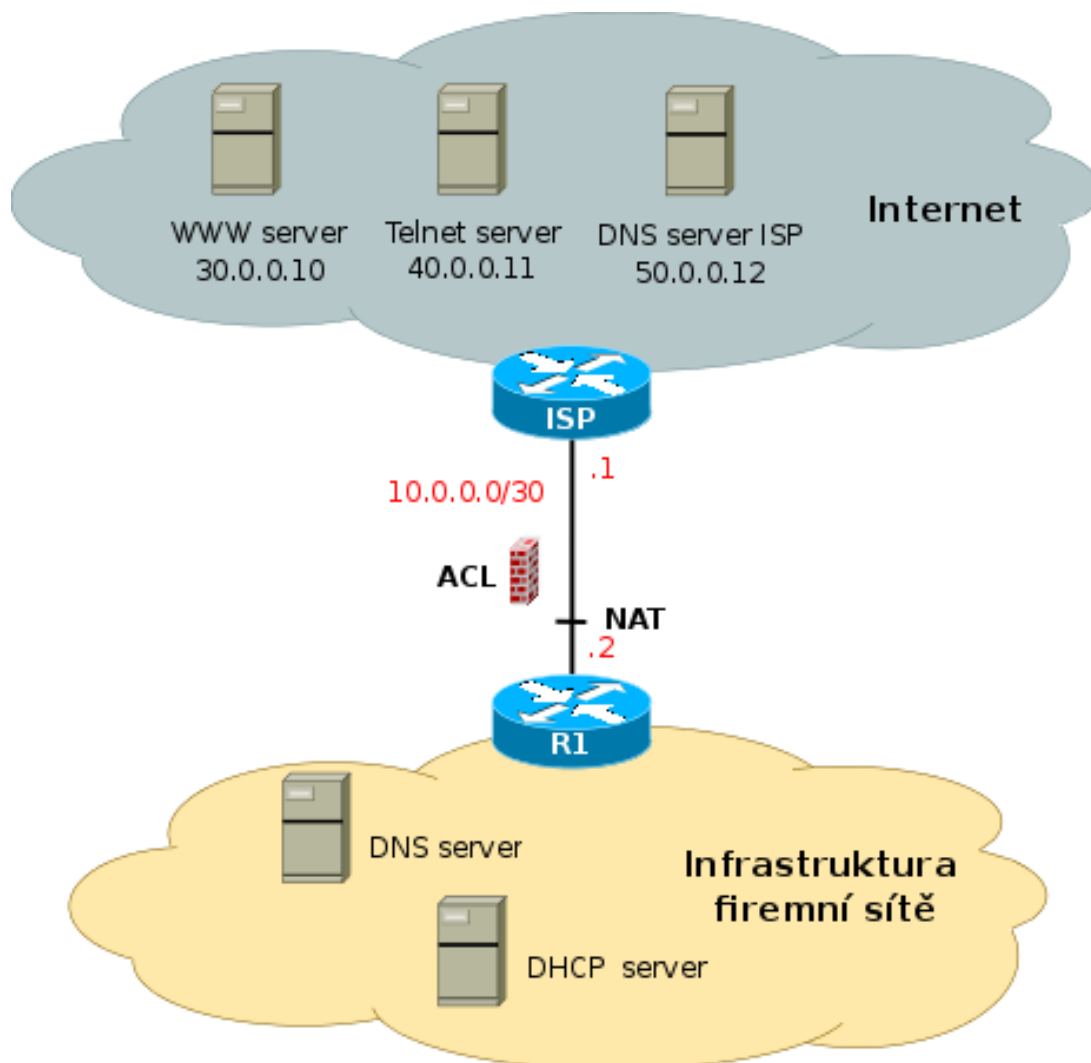Private prefix: 10.249.244.128/25
IPv6 prefix: 2002:57c7:2dac::/48
Segments with special meanings: NAT: VLAN A, DNS: VLAN C (PC2C), DHCP: VLAN C, T: VLAN C, N: VLAN C
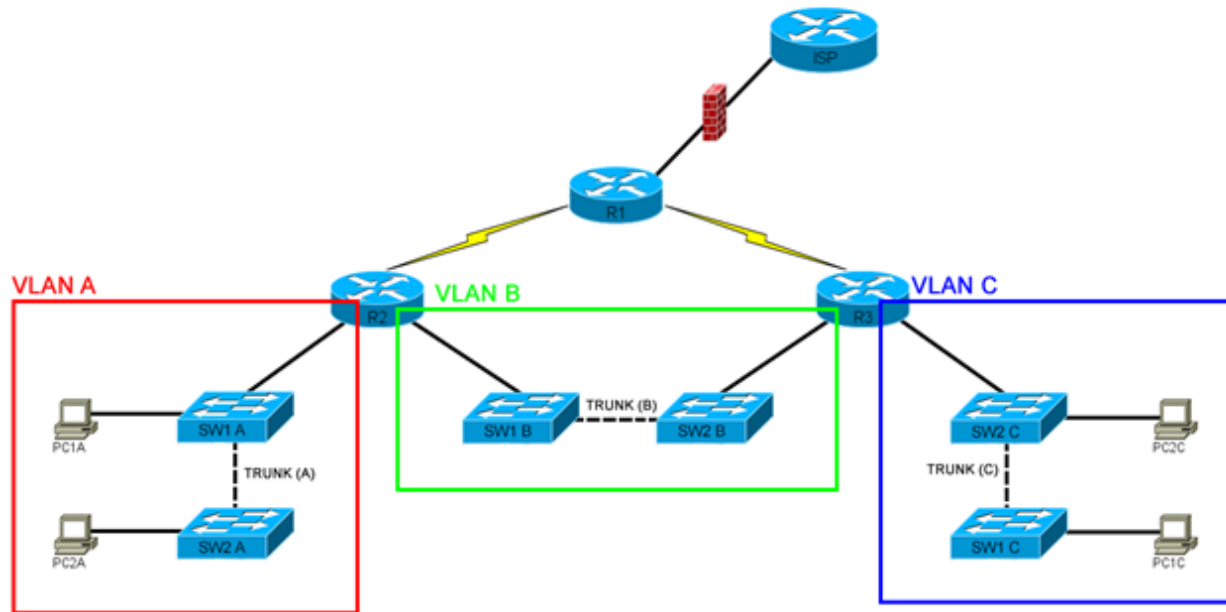NAT pool: 35
Routing protocol: RIP

Network Description

- The corporate network is connected to the ISP router by customer router R1. The line between routers ISP and R1 uses private address range that is not propagated into the Internet. A static router to the public address range of the corporate network is configured at ISP router and is propagated to the Internet.
- The corporate network boundary router (R1) filters the traffic between the corporate network and the Internet using ACL (Access Control Lists). Hosts residing on the Internet are represented by servers with addresses 30.0.0.10, 40.0.0.11 and 50.0.0.12.
- Various Cisco routers, Cisco Catalyst 2900-series switches and hubs are used in the corporate network infrastructure. The structure of the corporate network corresponds to one of the Topologies depicted in the Appendix (it will be assigned by a teacher to every

single group of students, together with the other design parameters). The ISP router and servers in the Internet are pre-configured and inaccessible to the students.

L3 Topology

IPv4:

Name	Calculate	Netmask
VLAN A	$52 + 1 + 2 = 55 <= 2^6$	$32 - 6 = 26$ (/26)
VLAN B	$0 + 2 + 2 = 4 <= 2^2$	$32 - 2 = 30$ (/30)
VLAN C	$170 + 1 + 2 = 173 <= 2^8$	$32 - 8 = 24$ (/24)
VLAN A (NAT POOL)	$35 + 1 + 2 = 38 <= 2^6$	$32 - 6 = 26$ (/26)
R1 – R2	$0 + 2 + 2 = 4 <= 2^2$	$32 - 2 = 30$ (/30)
R1 – R3	$0 + 2 + 2 = 4 <= 2^2$	$32 - 2 = 30$ (/30)
R1 - ISP	$0 + 2 + 2 = 4 <= 2^2$	$32 - 2 = 30$ (/30)

Private Address:

Name	Subnet	Usable Addresses	Broadcast
VLAN A	10.249.244.128/26	10.249.244.129 - 10.249.244.190	10.249.244.191

Public Address:

Name	Subnet	Usable Addresses	Broadcast
VLAN C	81.145.192.0/24	81.145.192.1 – 81.145.192.254	81.145.192.255
NAT POOL	81.145.193.0/26	81.145.193.1 – 81.145.193.62	81.145.193.63
VLAN B	81.145.193.64/30	81.145.193.65 – 81.145.193.66	81.145.193.67
R1 – R2	81.145.193.68/30	81.145.193.69 – 81.145.193.70	81.145.193.71
R1 – R3	81.145.193.72/30	81.145.193.73 – 81.145.193.74	81.145.193.75
R1 - ISP	10.0.0.0/30	10.0.0.1 – 10.0.0.2	10.0.0.3

DNS: 81.145.192.254

IPv6:

IPv6 prefix: 2002:57c7:2dac::/48

Name	Address	The First Use. Address	Last Used Address
VLAN C	2002:57c7:2dac:0000::/64	2002:57c7:2dac:0000::1	2002:57c7:2dac:0000::ffff:ffff:ffff:ffff
VLAN A	2002:57c7:2dac:0001::/64	2002:57c7:2dac:0001::1	2002:57c7:2dac:0001::ffff:ffff:ffff:ffff
VLAN B	2002:57c7:2dac:0002::/64	2002:57c7:2dac:0002::1	2002:57c7:2dac:0002::ffff:ffff:ffff:ffff
R1 – R2	2002:57c7:2dac:0003::/64	2002:57c7:2dac:0003::1	2002:57c7:2dac:0003::ffff:ffff:ffff:ffff
R1 – R3	2002:57c7:2dac:0004::/64	2002:57c7:2dac:0004::1	2002:57c7:2dac:0004::ffff:ffff:ffff:ffff
R1 – ISP	2002:57c7:2dac:0005::/64	2002:57c7:2dac:0005::1	2002:57c7:2dac:0005::ffff:ffff:ffff:ffff

Address Topology

R1 - ISP
10.0.0.0/30
2002:57c7:2dac:0005::/64
.1
0005::1

R1 - R2
81.145.193.68/30
2002:57c7:2dac:0003::/64
.69
0003::1
.70
0003::2
.2
0005::2

R1 - R3
81.143.193.72/30
2002:57c7:2dac:0004::/64
.73
0004::1
.74
0004::2

VLAN A
10.249.244.128/26
2002:57c7:2dac:0001
::/64
.129
0001::1
.189
0001::ffff:ffff:ffff:fffe
.190
0001::ffff:ffff:ffff:ffff

VLAN B
81.145.193.64/30
2002:57c7:2dac:0002::/64
.65
0002::1
.66
0002::2

VLAN C
81.145.192.0/24
2002:57c7:2dac:0000::/64
.1
0000::1
.253
0000::ffff:ffff:ffff:fffe
.254
0000::ffff:ffff:ffff:ffff

TRUNK (A)
TRUNK (B)
TRUNK (C)

PC1A
PC2A
SW1 A
SW2 A
SW1 B
SW2 B
SW2 C
SW1 C
PC2C
PC1C
R1
R2
R3
ISP