NETWORK, DESIGN & POC

Mother Russia

Version 1.2

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Contents

Introduction

The assessment of the BISM propaedeutic course consists of a knowledge test and two professional products. This document contains the case and the assignment for ÍProfessional product 2: a network design and Proof-of-Concept (PoC). Students individually create an elaboration of this professional product for BISM.

The next chapter contains the case description and the context for the assignment to be made. This is followed by an explanation of the assignment itself in chapter 2. The last chapter offers a look at the grading model that the teachers use for the assessment of the answers.

1 Case

The disintegration of the Union of the Soviet Socialist Republics (USSR) also marked the end of the notorious KGB secret service. At least that was the official story. After some time it turned out that this organization was still very much alive and had undergone a superficial makeover. The reincarnation of the KGB in the new nation-state of Russia is known today as FSB.

The organization still has its headquarters in a beautiful stately building on Lubyanskaya Square in Moscow. At the time of the KGB it still bore the name of the founder of the USSR secret service: Dzerzhinsky Square.

What has not changed much over time are the activities of the organization. Like other (secret) intelligence services, the FSB is engaged in eavesdropping on its own citizens and foreign data traffic. The service uses all kinds of techniques to intercept mail, eavesdrop on telephone conversations and even perform espionage via laptop webcams. For the storage of all collected raw data, the FSB has extensive underground capacity next to the cell complex under the former KGB building.

To analyze and interpret all the data collected, the FSB has employed a large number of people. This personnel must ultimately examine all data for actual threats to Mother Russia. For this purpose, the FSB will set up two departments that will have their own wing within the former KGB building: Domestic and Foreign.
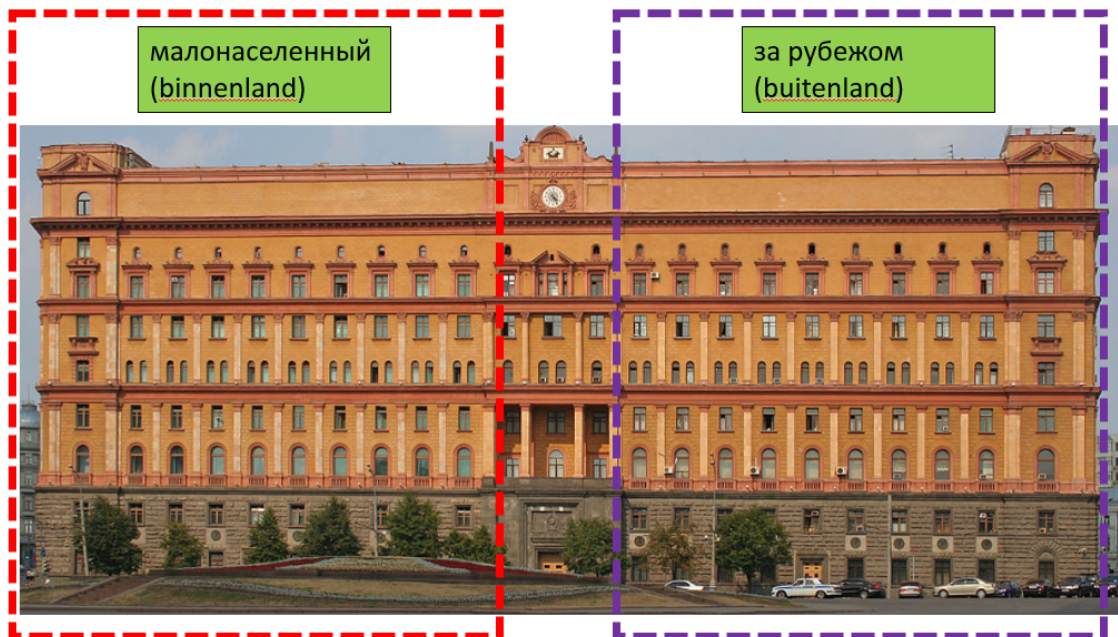
Figure 1 indicates that the building is in fact split in two to accommodate both departments. The KGB data center is located in the basement. The design of the workspaces and the infrastructure is still in its infancy. As Figure 2 shows, only the backbone for the network is actually already available.

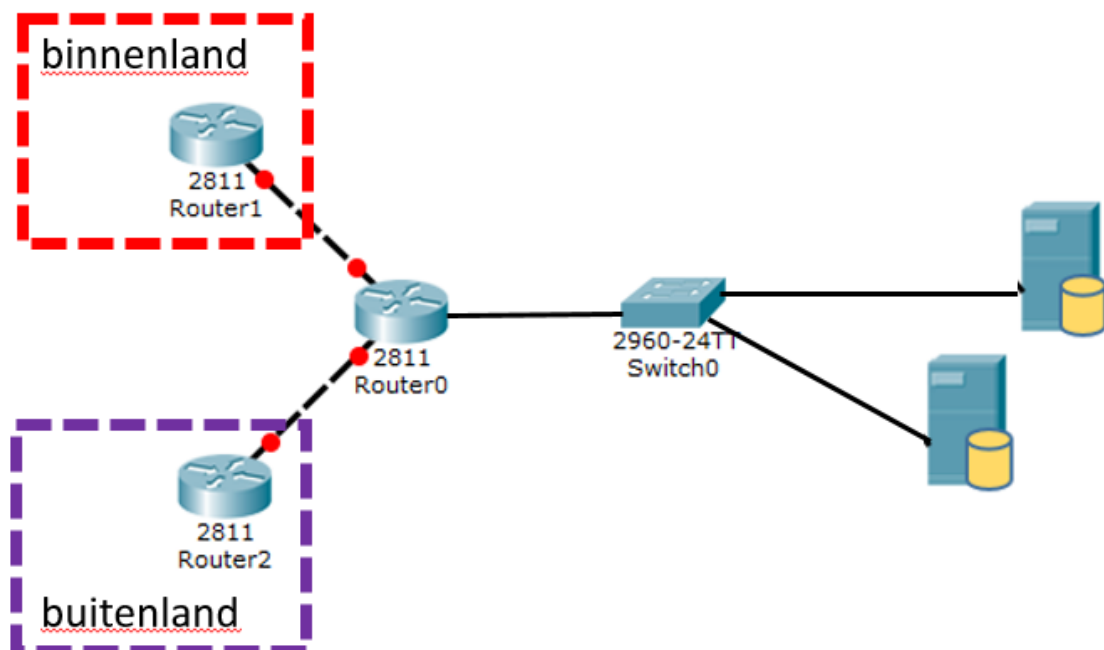This backbone consists of three routers that connect the workspaces of the Interior and Abroad departments with each other and with the data center in the basement. The database physically consists of 2 servers on which the data of the relevant departments

stands. The physical and logical configuration of the equipment with interfaces, IP addresses and routing tables, etc. is not yet complete: the network is still in the design phase.

1.1 FSB Directives

It goes without saying that the FSB closely monitors its own IT facilities. That is why the Domestic and Foreign departments are only allowed to use hardware approved by the FSB. Strict rules apply to the organization of the network and the departments:

- One network segment does not contain more than 164 workstations.
- Unlike servers, client computers do not receive a fixed IP address, but use DHCP.
- DNS is available for translating host names to IP addresses.
- Routing is only done manually in order not to depend on Western protocols such as RIP, OSPF, EIGRP or IS-IS.
- The standard for network connections is Ethernet. Serial or other types of connections are not allowed.

In order to accommodate all servers, clients and routers in the network of the Russian government, the FSB has made a number of network segments available to accommodate all clients, servers and network equipment. This equipment may only use IP addresses from one of the following ranges:

Network	Subnet	Subnet mask
1	192.168.1.0	255.255.255.0
2	192.168.4.0	255.255.255.0
3	192.168.5.0	255.255.255.0
4	192.168.8.0	255.255.255.0
5	192.168.16.0	255.255.255.0
6	192.168.32.0	255.255.255.0
7	192.168.64.0	255.255.255.0
8	192.168.96.0	255.255.255.0
9	192.168.128.0	255.255.255.0
10	20.0.1.0	255.255.255.0
11	20.0.2.0	255.255.255.0
12	20.0.3.0	255.255.255.0
13	172.16.1.0	255.255.255.0
14	15.0.0.128	255,255,255,248
15	15.0.0.64	255,255,255,248
16	19.0.0.32	255,255,255,248
17	10.0.0.16	255,255,255,248
18	10.0.0.32	255,255,255,248

The use of IP addresses from other subnets carries heavy penalties within the FSB. However, sufficient capacity is available within the available subnets to house all systems of the new departments. A precondition for using these subnets is that the number of assigned devices does not exceed the number allowed per subnet.

Although there is no formal limit to the number of routers and switches in the network, the FSB's experience is that a smaller number of routers leads to more manageable and secure networks.

1.2 Domestic

The Interior Department will investigate mail and telephone traffic and social media to detect subversive expressions such as "Putin is crazy" or "McDonalds forever" and all kinds of possible variations on these themes. A number of subdepartments will carry out this work:

- Crime brigade with 95 employees
- Ukraine Front with 112 employees
- Matryoshkagarde with 286 employees

The following specifications apply to the network to be set up:
- Subdepartments all have separate workspaces with fixed workstations.
- All subdepartments will have their own subnets that of course meet the requirements of the FSB.
- All network connections use wired network connections. For security reasons, the FSB does not allow wireless connections.
- Subdepartments have their own server with a web application containing general (sub)departmental information. The employees of the subdepartments must be able to reach the web applications at the following addresses:
  - O crime brigade.fsb.ru
  - O ukrainefront.fsb.ru
  - O matryoshkagarde.fsb.ru

1.3 Abroad

The Foreign department processes image, sound and other data from all kinds of international human and non-human sources. In order to properly interpret all possible forms of capitalist and nationalist propaganda, this department has two branches, each with its own area of   interest:
- Yellow Dragon is growing fast and now has 172 employees
- White Decadence is a merger of existing departments and has 284 employees

The following specifications apply to the network to be set up:
- Subdepartments all have separate workspaces with fixed workstations.

- All subdepartments will have their own subnets that of course meet the requirements of the FSB.
- All network connections use wired network connections. For security reasons, the FSB does not allow wireless connections.
- Subdepartments have their own server with a web application containing general (sub)departmental information. The employees of the subdepartments must be able to reach the web applications at the following addresses:
  - yellowdragon.fsb.ru
  - whitedecadence.fsb.ru

2 Assignment

The network of the new departments of the FSB is still in the design phase. For Professional Product 2 of the propaedeutic course BISM, students are instructed to further develop this network. The command is therefore:

Make a design for this network and test the design in a Proof-of-Concept.

To approach this assignment, the intention is to first make a design of the network based on the information from the case. The design must meet the functional and technical requirements. Network segments must be able to provide the connections for the required workstations and network traffic with other subnets must be possible.

The design must contain both a description and a sketch of the network. The sketch should be sufficient**functional and network information**to be self-explanatory. Not all workplaces and switches need to be included in the sketch: it is about the functional and technical network information that must make the network work. Clearly name the different parts of the design to make it easier to build and test the PoC and write the report.

To make the sketch you need to use Cisco Packet Tracer**not** Allowed. Graphic drawing tools like MS Visio or a free alternative (Pencil or one of these: https://www.guidingtech.com/free-microsoft-visio-alternatives/) are suitable tools for this job. Also have a look atExcaliDraw .

To test whether the designed network also works, a Proof of Concept (PoC) is required. The PoC must contain a working model of the designed network that demonstrates that the design made can also be used in practice. To create the PoC, the use of Cisco Packet Tracer is mandatory. The working implementation of the PoC must of course correspond to the drafted design. To be representative of the design, each network segment should contain at least two client computers and a switch. For other network equipment and servers, they must all be included in the PoC.

In the assessment, teachers can award bonus points for the processing of functionality that goes beyond what is described in the case. The assessment model contains some examples of this.

Students deliver the following products for BISM Professional Product 2:

- A report with the description and sketch of the network design. For this report, the rules for writing and compiling a report that were learned earlier in the propaedeutic phase apply. A number of parts are mandatory:
  - O A description of the assignment and the approach.
  - O The substantive description and the sketch of the network design.
    This also includes an overview of the subnets used and an overview of the contents of the routing tables of the routers used.
  - O An image of the network PoC in an attachment.
  - O A description of how the testing activities of the PoC took place. Screen shots can serve as proof of operation.

- A file in Cisco Packet Tracer format containing the detailed PoC.

3 Check model

Figure 2 below shows an image of the assessment model teachers use to assess Professional Product 2 of BISM.

NAAM:	Bill Gates

OPMAAK DOCUMENT	VINK	OPMERKINGEN
voorblad aanwezig?		
voorwoord aanwezig?		
inleiding aanwezig?		
inhoudsopgave?		
stijl toegepast?		
paginanummering?		
genummerde hoofdstukken?		
plaatjes met nr en titel?		
(indien rood-->KO)		

TAALGEBRUIK	VINK	OPMERKINGEN
informatief en zakelijk?		
spelfouten/pag < 5 ?		
Geen ik-vorm?		
(indien rood-->KO)		

RICHTCIJFER	0.0	Dit is een richtcijfer. Docent mag om welke reden dan ook afwijken, mits toegelicht.
	EIND	TOELICHTING
Bill Gates	0.0	Er zijn nog 4 punt en over om een bonus toe te kennen

NETWERKRAPPORT		
Requirements	**Score**	**Max**
Subnetten op afdelingen	0	5
Iedere afdeling heeft DHCP	0	5
DNS server aanwezig	0	5
Elke (sub)afdeling een WEB server	0	5
Netwerktekening	**Score**	**Max**
Routers juist ingetekend	0	3
Switches juist ingetekend	0	3
Services juist ingetekend	0	3
Netwerk is conform requirements	0	3
Subnets: genoeg IP-addressen	0	3
Routing tabel opgenomen	0	3
Routing tabel is correct	0	3
PROOF OF CONCEPT		
Functionaliteit	**Score**	**Max**
Pingen tussen subafdelingen	0	10
Pingen tussen afdelingen	0	10
DHCP servers aanwezig(en werkt)	0	5
DNS server aanwezig (en werkt)	0	5
Webpagina op te vragen (URL)	0	5
bonus1 (dubbeluitgevoerde routes)	0	5
bonus2 (zeer overzichtelijk)	0	5
bonus3 (DHCP relay)	0	5
bonus4	0	5
Totaal	**0**	96

Figure 2: Assessment model