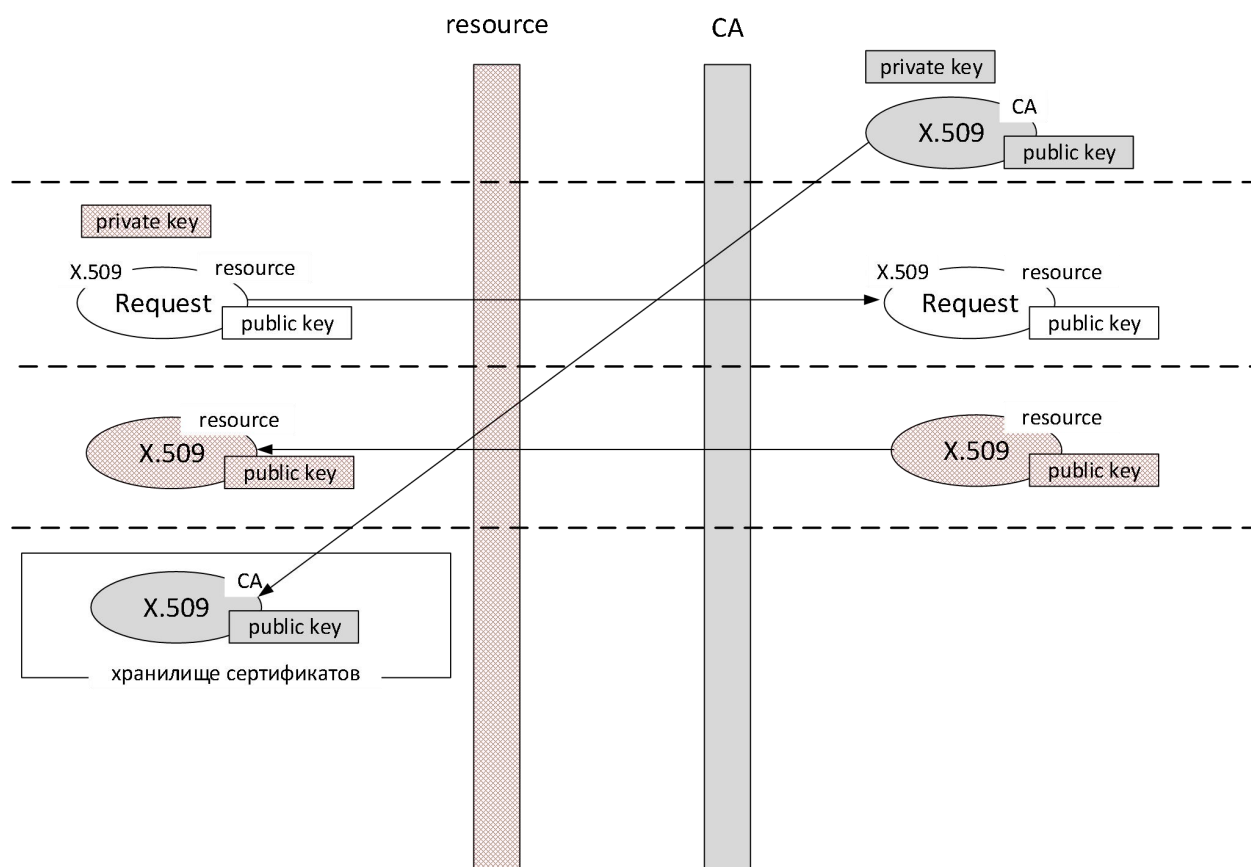# HTTPS

1. HTTPS: процесс формирование удостоверяющим центром (центром сертификации) X.509-сертификата для resource

2. HTTPS: генерация приватного ключа CA.

```
C:\Users\User Pc\Desktop\CA\PSCP>openssl genrsa -des3 -out CA.key 2048
Loading 'screen' into random state - done
Generating RSA private key, 2048 bit long modulus
......+++
...+++
e is 65537 (0x10001)
Enter pass phrase for CA.key:
Verifying - Enter pass phrase for CA.key:

C:\Users\User Pc\Desktop\CA\PSCP>dir
 Том в устройстве C не имеет метки.
 Серийный номер тома: DAAB-2524

 Содержимое папки C:\Users\User Pc\Desktop\CA\PSCP

27.03.2020  20:19    <DIR>          .
27.03.2020  20:19    <DIR>          ..
27.03.2020  20:20             1 743 CA.key
25.03.2020  02:32           151 993 CA_X.docx
27.03.2020  20:13             1 689 cmd.txt
26.03.2020  23:13               428 SMW60.by.cfg
27.03.2020  01:20               465 SMW60.com.cfg
25.03.2020  02:32           151 993 xCA.docx
               6 файлов           308 311 байт
               2 папок    2 026 725 376 байт свободно
```

```
CA.key
 1    -----BEGIN RSA PRIVATE KEY-----
 2    Proc-Type: 4,ENCRYPTED
 3    DEK-Info: DES-EDE3-CBC,85AE725DE6E71114
 4
 5    coJpujHAQMoBSo5NhMnMO3+brjnEohHz7claLrN4jCbB9p9hYLRtJkb75gXDN1dX
 6    W8wzXbpjY/3UVGv4Z6U6B0KCUK/XxX2VpJG1jpOy/gncVIARnE4XrXxX/vVyWKmL
 7    ylucG9HeacW5fU3/RgA27vCAzzzyroOR5cLIPejKs4SHejBGcAfawpH0sZ6B4IhS
 8    QOAjUbc0BcyRBk9+thnLXp+qs/wVX1oE8rxLqIGgFChAgm/c/skLwB6OX7HpITJO
 9    ChRLyVrKFCpAwqqBfZGSWLTpzNwieOUJwSwrXnxVKDTTw7hOeCkpuN6lNgJVzyTz
10    p284q5I5t94QBDUCFNHWWXnpEyUw7O8QFExfaq3BRlp3vwUna3Zxig8QI3VC1F95
11    AgnW6HJurnwglDRU08tTy4GON9YfiOjanWd8k+04JHjuIQGKaCyRT4nlVHp+MiFY
12    heFMv2OMce44bDjA+LRwkuECHBd7zBR/RqYT2+taX9kRF7hiS9AUsRIdLi7Ourxr
13    GGikHcOcoGfmGD4bX6hi/cRqRIbuzHh7oVkmxueVSMwEF6iYjt3g+AxNBjO008do
14    MOj4EdniL8VlcX/iwuK3A67vHdlKZCsptRl8bWwR9u/fZ2nMB2U8Pp51szkxbI3R
15    WuW3k2AvNS4uUzHjqXQ81ySp4MP6NL0KalcGn4I5txiFrj+ZiZjC5e+85wJmFTCJ
16    EC9WgU+4lI3NeKzKXxCniPBrYHJLH6ZvvtKZbl1jGWIf/0lqUvKo2hBGpcAENg+V
17    y0kI9fPYah2Ix0Yu9lYlOYZMtcDXhPI/wxOxO4ISzTEbr6KfnNOco2T0bPNjG+YM
18    L/ZQWDgXg/fidTx14Jy9Ypu8ucFundKBZOSpxAoDbN0d0XiDzb0yU+12Ouo3USeo
19    YYM5h2CkvYVakRoLLmB591u2XPeD4v/qX3WOGnMIJzMsuM54Qzb6FBpilL4ZtwQd
20    BWlqSG8M5wYSVaZtXWAwq5SrMbpI51SdFXG63cpZ7n63gR/UMP5NA9g06Uk1Ve4P
21    spcUNysDFSsMBUWW43ImvcvHz+k9esmGjEMEt+EGjD0OQQJg6EIsw/dwmeLeLK7c
22    ehxXDiUr+jtkIFjs9ZiYBO8oL5TkrF4ps2x+GeQNVWPKo0ZIfycZ1VeiZz1qRNqi
23    uDY3VQjfFZ0tLMyfRiaqhSpuRQOhexJgNJrTufizGu2ly/CnyTx+M6r0p+W93LwU
24    /xmyQekRGUaHwkLmfSbEHStZmgizvnSRT/iFlQkNxCJ4zHiPaI5z6gyTqzTktm2l
25    VavPFyoIZMk/sOyIAyYv+qtCh65pH8Ux9+fdZP7GU4HjLW8y6UTmqaA6SxxyvSfQB
26    LANavvgw1SjHUmERfxEk6iBmREn1ZrL8b0jggFLYD/fx+w5Yp1HWWYEiyjHVivJt
27    HE1l304fgVJ2D1D3z3cTjiuEYFmLIo4u4/x/Y0F4Yz1qSM/pgo06tSD9aOmybXAt
28    eboNwcL1FfH0f3APMJmyj49AYmQhqPGY4b0z7nVFgp2hCxIxB0iPvMUmj/fJ982f
29    bl8+7DSKmRlYO5aLgp3yFy8hTCm3lZeBD08ORKIrMoSF39gP1X8b6Q==
30    -----END RSA PRIVATE KEY-----
```

3. HTTPS: генерация сертификата CA

```
C:\Users\User Pc\Desktop\CA\PSCP>openssl req -x509 -new -key CA.key -days 700 -sha256  -out CA.crt
Enter pass phrase for CA.key:
Loading 'screen' into random state - done
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:BY
State or Province Name (full name) [Some-State]:Minsk
Locality Name (eg, city) []:Minsk
Organization Name (eg, company) [Internet Widgits Pty Ltd]:BELSTU-IT
Organizational Unit Name (eg, section) []:BELSTU-IT-IS&T
Common Name (eg, YOUR name) []:ISIT
Email Address []:isit@belstu.by

C:\Users\User Pc\Desktop\CA\PSCP>dir
 Том в устройстве C не имеет метки.
 Серийный номер тома: DAAB-2524

 Содержимое папки C:\Users\User Pc\Desktop\CA\PSCP

27.03.2020  20:29    <DIR>          .
27.03.2020  20:29    <DIR>          ..
27.03.2020  20:29             1 631 CA.crt
27.03.2020  20:20             1 743 CA.key
27.03.2020  20:25           144 482 CA_X.docx
27.03.2020  20:13             1 689 cmd.txt
26.03.2020  23:13               428 SMW60.by.cfg
27.03.2020  01:20               465 SMW60.com.cfg
25.03.2020  02:32           151 993 xCA.docx
               7 файлов        302 431 байт
               2 папок   2 020 368 384 байт свободно
```

```
CA.key        CA.crt
1    -----BEGIN CERTIFICATE-----
2    MIIEhjCCA26gAwIBAgIJAMOxidUXHsH9MA0GCSqGSIb3DQEBCwUAMIGIMQswCQYD
3    VQQGEwJCWTEOMAwGA1UECBMFTWluc2sxDjAMBgNVBAcTBU1pbnNrMRIwEAYDVQQK
4    EwlCRUxTVFUtSVQxFzAVBgNVBAsUDkJFTFNUVS1JVC1JUyZUMQ0wCwYDVQQDEwRJ
5    U0lUMR0wGwYJKoZIhvcNAQkBFg5pc2l0QGJlbHN0dS5ieTAeFw0yMDAzMjcxNzI5
6    MTlaFw0yMjAyMjUxNzI5MTlaMIGIMQswCQYDVQQGEwJCWTEOMAwGA1UECBMFTWlu
7    c2sxDjAMBgNVBAcTBU1pbnNrMRIwEAYDVQQKEwlCRUxTVFUtSVQxFzAVBgNVBAsU
8    DkJFTFNUVS1JVC1JUyZUMQ0wCwYDVQQDEwRJU0lUMR0wGwYJKoZIhvcNAQkBFg5p
9    c2l0QGJlbHN0dS5ieTCCASIwDQYJKoZIhvcNAQEBBQADggEPADCCAQoCggEBAJ3y
10   rTgDBIe//3GtmH61mxEiXg/OIVDgCFir6sdtWwt+36l7IedXrEyyhLNOTI4mAi91
11   5lhzbkxV8jVnDgi5I+etQFOcJHk3TPxbjXKfhM2WoRSgVm6xmLZr22KXjCbYFeu7
12   xcAYCtIwe5IOOlFKuU6o/hsxVgCpW81Yy3tvIxejrMzV7hkPVPlWhW1kWUTYAmcK
13   zWrrF9x/Fjt8G3K7VPeWp8kwLg0uyq9klNR7pDcwCsoVVk7u9/n8lAR/aSDZhTCh
14   WLszngez/nOK7LLSFWteDIWdC1PhQCs0qjm0lC5tPigstP0xkCvl9Zg8ZInrGiax
15   EhgaCRW8LQVB6Z9amS8CAwEAAaOB8DCB7TAdBgNVHQ4EFgQUZoS22DQq70S7SQZx
16   KTzAwU1MUTIwgb0GA1UdIwSBtTCBsoAUZoS22DQq70S7SQZxKTzAwU1MUTKhgY6k
17   gYswgYgxCzAJBgNVBAYTAkJZMQ4wDAYDVQQIEwVNaW5zazEOMAwGA1UEBxMFTWlu
18   c2sxEjAQBgNVBAoTCUJFTFNUVS1JVDEXMBUGA1UECxQOQkVMU1RVLUlULUlTJlQx
19   DTALBgNVBAMTBElTSVQxHTAbBgkqhkiG9w0BCQEWDmlzaXRAYmVsc3R1LmJ5ggkA
20   w7GJ1Rcewf0wDAYDVR0TBAUwAwEB/zANBgkqhkiG9w0BAQsFAAOCAQEAQ8SxgXQg
21   V3maDKCutVp8vWQtF+2si+zMYzunY/D+m/xmyAuPtkIkM+bKS30uGzOBxhhKC/mn
22   gEawmWeXuYnFzO14xLNeEOKo0qxCcujwrUYK7Q740RqjR01Z5PlZpmSrFWx8P5pG
23   dKkVVEb3RY6HMLBow6EXi1xFNtYLN7FYgY+cf0v7LejfkzknFVbJ0COIPMYlTVuR
24   zAeDWNggw2iaUvS7ATuaoQS6pMYMZYUGXeLiXVe+nikbsCJjEGkws38zisnHtyXL
25   S78dDneu31uxVg6ubzLASI9JswQMnEwIkUzPoG+n7akIT3UX5TWQ3XFuW9ZmLnBC
26   x0egI/ICm65hEA==
27   -----END CERTIFICATE-----
```

4. HTTPS: генерация приватного ключа ресурса

```
                                                        Командная строка

C:\Users\User Pc\Desktop\CA\PSCP>openssl genrsa -out  LAB.key 2048
Loading 'screen' into random state - done
Generating RSA private key, 2048 bit long modulus
......................................................+++
.......................................................................
e is 65537 (0x10001)

C:\Users\User Pc\Desktop\CA\PSCP>dir
 Том в устройстве С не имеет метки.
 Серийный номер тома: DAAB-2524

 Содержимое папки C:\Users\User Pc\Desktop\CA\PSCP

27.03.2020  20:38    <DIR>          .
27.03.2020  20:38    <DIR>          ..
27.03.2020  20:29             1 631 CA.crt
27.03.2020  20:20             1 743 CA.key
27.03.2020  20:25           144 482 CA_X.docx
27.03.2020  20:38             1 726 cmd.txt
27.03.2020  20:38             1 679 LAB.key
26.03.2020  23:13               428 SMW60.by.cfg
27.03.2020  01:20               465 SMW60.com.cfg
25.03.2020  02:32           151 993 xCA.docx
               8 файлов        304 147 байт
               2 папок   2 012 209 152 байт свободно
```

```
 CA.key     CA.crt    LAB.key

 1    -----BEGIN RSA PRIVATE KEY-----
 2    MIIEpAIBAAKCAQEAzMcYGeKoXsFg0OXJSaCwFqk/x0bLid2fOvoYx9NMEniyIXV6
 3    qF4XHuvCT9xOb7ecAPxRmAbGnwSndzzHaGQRUvuoe2XEZOba7nN7bc3zsZA+zvCz
 4    sm17dlWAlZk9qiMTrXqOxA9vAIjvSCoUU5TCBdxoeDtJyaceKvzAfkyXWXeMeRJk
 5    fk8KU1fNLYpz1zXDhSI4av3S0ssXY7kaoKoHSmzyARUIMsIGfwdsU4ZUlPjl9YM4
 6    2Czn9rxAys1UUY6ihJ4i74usnwjxWwnE4kcYvl1eYue+NI5pz0K5uhVd1dxL3glA
 7    uqzw81DmMJiDwMD2yF+DjkuQLI3yN4c/28VRxQIDAQABAoIBAF9dxSqg9RqT4nvG
 8    1/QzIm6bSbmLjdTZ4oL74DiHfeEIVqTgakwo7YmX8Dly9xBuKPgIihNL7Io4B6mv
 9    I4rJN4w26SL2pPz8yi7Ml0nu5TPnYmjLjlRlSl80uJpy8FXg2hQrhHtoWKCeJRmt
10    hyPZnnZOTFTZ/6Yq7xDD/v2Su9WM0gDiatdi66LschXLhysPjxsiQ3540N1fafXd
11    QHZxKQPicddgkFLO8V9p9mJXEv/dIIbjCjEhGvWs10O7Egeo2BpcKVbcnmxMaO34
12    MGHp/O+xvUDfMqbF4xqf/5R3mCKasg25Mr3fgddbKk0nEIXLFwNsEOOhUYVY1nlL
13    32B6SGECgYEA/XRHjq4qwiAJweNxTOzpnc1mrIPl6bcyT/WQwBCarJrkQGf9VnoS
14    UE7Q+TiPiLijigVv1J8DK+QhHUn9gt6msJMTF3qOW7KHV+aueHY/8TvvB0HiSwE4
15    +QR2IgOi4S7H77DLLxp6B3pQIEQZ8DZR2kyXgjQygxG07iyj70gxE70CgYEAztWm
16    bThxwjvgWaDUeV6T9g2cX2Zj80nx2EmEvb23m2Vqqw6gI5BqOgoazjn2BZXKxlod
17    xDGNjBJoCHtQp50J0QUtLCkKHybxzKIEolpPYb1F8h6cOOo0nuUX+rEPlTftdf+O
18    JYMon2tKBGJUZ+aib+C3wXlZO3usBHgb98GsEqkCgYEAk0urdnEjqlPCN+r9Yo5g
19    qnO/kszIpg3wcGWvLN+5dExEEGYe5c3lrMRRUDUdvYBIkqLcPf33ct+Omx3v9cl9
20    qCqhMsjnyMS1QVFv3dQjDwgcvuP8JkjcmmOMX/IrC6ELUvI08vf5KTVdMZNCW8bF
21    xQ80EdhR7rgwpSZOU3ZqByUCgYBTxQY9sCGqyDNqOZA0g9CrVAHkRYTvsSApOEVx
22    z5fAcUfNdgP3w3KyhQssQR9aTbutsCvkHSm19HJ8FO2qpRintlAAVbLKwSwnc+sq
23    kicab90XXbxp9LlRLXoTx4iHJ/qd0u10T/Ww83Qr6GNFHYzmgP4Ldwlj5QfbW4YA
24    R01Y2QKBgQCFJvo3IxLgddZrGcNBSM4HYya6jW868zOhPVPFloPMXyDUKbibTExy
25    D8+IIpUOXvJYwxMfdtA0g63I1Uy8bPGcdiPOYEZ6gp18lqVN7rtvddT4HmoqRJGt
26    NukDIzsNDKZ4QvfYmZn8zTCabdrF2N3MeC2BJbyuxxwVh1p5ee9tIQ==
27    -----END RSA PRIVATE KEY-----
```

5. HTTPS: генерация запроса на сертификат для ресурса

```
CA.key ⊠   CA.crt ⊠   LAB.key ⊠   LAB.cfg ⊠

 1   [req]
 2   distinguished_name = req_distinguishe
 3   req_extensions = v3_req
 4   prompt = no
 5
 6   [req_distinguished_name]
 7   C = BY
 8   ST = Minsk
 9   L = Minsk
10   O = BELSTU-IT-ISIT-LAB
11   OU = ISIT-LAB
12   CN = ISIT-LAB
13
14   [v3_req]
15   keyUsage = keyEncipherment, dataEncipl
16   extendedKeyUsage = serverAuth
17   subjectAltName = @alt_names
18
19   [alt_names]
20   DNS.1 = LAB
21   DNS.2 = ISIT-LAB
22   DNS.3 = ISIT.LAB
23   DNS.4 = A306-2-SMW60
```

```
                              Командная строка

C:\Users\User Pc\Desktop\CA\PSCP>openssl req -new -key LAB.key -out LAB.csr -sha256  -config LAB.cfg
Loading 'screen' into random state - done

C:\Users\User Pc\Desktop\CA\PSCP>dir
 Том в устройстве C не имеет метки.
 Серийный номер тома: DAAB-2524

 Содержимое папки C:\Users\User Pc\Desktop\CA\PSCP

27.03.2020  20:57    <DIR>          .
27.03.2020  20:57    <DIR>          ..
27.03.2020  20:29             1 631 CA.crt
27.03.2020  20:20             1 743 CA.key
27.03.2020  20:25           144 482 CA_X.docx
27.03.2020  20:57             1 794 cmd.txt
27.03.2020  20:50               442 LAB.cfg
27.03.2020  20:57             1 151 LAB.csr
27.03.2020  20:38             1 679 LAB.key
26.03.2020  23:13               428 SMW60.by.cfg
27.03.2020  01:20               465 SMW60.com.cfg
25.03.2020  02:32           151 993 xCA.docx
              10 файлов         305 808 байт
               2 папок   2 006 831 104 байт свободно

C:\Users\User Pc\Desktop\CA\PSCP>
```

```
CA.key    CA.crt    LAB.key    LAB.cfg    LAB.csr

 1   -----BEGIN CERTIFICATE REQUEST-----
 2   MIIDGjCCAgICAQAwcDELMAkGA1UEBhMCQlkxDjAMBgNVBAgTBU1pbnNrMQ4wDAYD
 3   VQQHEwVNaW5zazEbMBkGA1UEChMSQkVMU1RVLU1ULU1TSVQtTEFCMREwDwYDVQQL
 4   EwhJU0lULUxBQjERMA8GA1UEAxMISVNJVC1MQUIwggEiMA0GCSqGSIb3DQEBAQUA
 5   A4IBDwAwggEKAoIBAQDMxxgZ4qhewWDQ5clJoLAWqT/HRsuJ3Z86+hjH0OwSeLIh
 6   dXqoXhce68JP3E5vt5wA/FGYBsafBKd3PMdoZBFS+6h7ZcRk5truc3ttzfOxkD7O
 7   8LOybXt2VYCVmT2qIxOteo7ED28AiO9IKhRTlMIF3Gh4O0nJpx4q/MB+TJdZd4x5
 8   EmR+TwpTV80tinPXNcOFIjhq/dLSyxdjuRqgqgdKbPIBFQgywgZ/B2xThlSU+OX1
 9   gzjYLOf2vEDKzVRRjqKEniLvi6yfCPFbCcTiRxi+XV5i5740jmnPQrm6FV3V3Eve
10   CUC6rPDzUOYwmIPAwPbIX4OOS5AsjfI3hz/bxVHFAgMBAAGgZTBjBgkqhkiG9w0B
11   CQ4xVjBUMAsGA1UdDwQEAwIEMDATBgNVHSUEDDAKBggrBgEFBQcDATAwBgNVHREE
12   KTAnggNMQUKCCElTSVQtTEFCgghJU0lULkxBQoIMQTMwNi0yLVNNVzYwMA0GCSqG
13   SIb3DQEBCwUAA4IBAQBRgSTjPhFOOZKwQAP46muhz12OOk813l73eBc4Mnu3CIO2
14   XDO7lt0aCzXesKdECrgfu9zzPamTCmro9OKMF/w8DsJS+MT5ba1NYC7jpVmZEwir
15   bsiOydzMb7e1p525NGX6pHmsFQouzRbc/I5lof0Pd+900ktXu/y+dVSZ/Y9/JST1
16   2uCwOmy5rKEp+terS3nLaK5zJU3dNfgIpcS7mda/n81u6D29V7/dfPzIo6ebF2Me
17   brVuMuCxDt4zqQujD7j6EJ/ioyMJVqiULZd5Ez1dP0pTjB7cNbo9JW31TADgatO2
18   n3+RdjScsvpBGaq0KKlL/X/2ygKvl1mbwGi6ptqW
19   -----END CERTIFICATE REQUEST-----
```

6. HTTPS: генерация сертификата для ресурса


```
CA.key    CA.crt    LAB.key    LAB.cfg    LAB.csr    LAB.crt

 1   -----BEGIN CERTIFICATE-----
 2   MIID0jCCArqgAwIBAgIJAP1/78YpQ9nAMA0GCSqGSIb3DQEBCwUAMIGIMQswCQYD
 3   VQQGEwJCWTEOMAwGA1UECBMFTWluc2sxDjAMBgNVBAcTBU1pbnNrMRIwEAYDVQQK
 4   EwlCRUxTVFUtSVQxFzAVBgNVBAsUDkJFTFNUVS1JVC1JUyZUMQ0wCwYDVQQDEwRJ
 5   U0lUMR0wGwYJKoZIhvcNAQkBFg5pc2l0QGJlbHN0dS5ieTAeFw0yMDAzMjcxODA5
 6   NDFaFw0yMTAzMjcxODA5NDFaMHAxCzAJBgNVBAYTAkJZMQ4wDAYDVQQIEwVNaW5z
 7   azEOMAwGA1UEBxMFTWluc2sxGzAZBgNVBAoTEkJFTFNUVS1JVC1JU0lULUxBQjER
 8   MA8GA1UECxMISVNJVC1MQUIxETAPBgNVBAMTCElTSVQtTEFCMIIBIjANBgkqhkiG
 9   9w0BAQEFAAOCAQ8AMIIBCgKCAQEAzMcYGeKoXsFg0OXJSaCwFqk/x0bLid2fOvoY
10   x9NMEniyIXV6qF4XHuvCT9xOb7ecAPxRmAbGnwSndzzHaGQRUvuoe2XEZOba7nN7
11   bc3zsZA+zvCzsm17dlWAl2k9qiMTrXqOxA9vAIjvSCoUU5TCBdxoeDtJyaceKvzA
12   fkyXWXeMeRJkfk8KU1fNLYpz1zXDhSI4av3S0ssXY7kaoKoHSmzyARUIMsIGfwds
13   U4ZU1Pj19YM42Czn9rxAys1UUY6ihJ4i74usnwjxWwnE4kcYvlleYue+NI5pz0K5
14   uhVd1dxL3glAuqzw81DmMJiDwMD2yF+DjkuQLI3yN4c/28VRxQIDAQABo1YwVDAL
15   BgNVHQ8EBAMCBDAwEwYDVR0lBAwwCgYIKwYBBQUHAwEwMAYDVR0RBCkwJ4IDTEFC
16   gghJU0lULUxBQoIISVNJVC5MQUKCDEEzMDYtMi1TTVc2MDANBgkqhkiG9w0BAQsF
17   AAOCAQEAb8Nqr70Bg1syhLw6Fddqo6eTkq15+i9ERFJkbtekSKEsl0syIeb9KOAV
18   S8OMgxYmLlznnIRQo3EAqGKXzvrxa8CTzLxpr9TlAACXyvLqxmlZ87RQ5HSuzrJ0
19   3JVBuGSnmNYArovswSFT8QXsqM+VLo//XsBkX7uVU6KzxSGfjLOK4piYx9JmVpXs
20   3tetXyZGQR9gsovQAvxxcZoVmDAUNYFt9iJL+0Kn1T0Lp7w5CvIZQ+CcyN9JoCZn
21   2fQjwI5mgpYhruE6HyURNeZUWbDGqF8wqooM0PcRLkOdUaAWe1YHLHW4K4H5cPiz
22   CdcJR8W9jp61J+N9FFuIRDnJQMTsaQ==
23   -----END CERTIFICATE-----
```

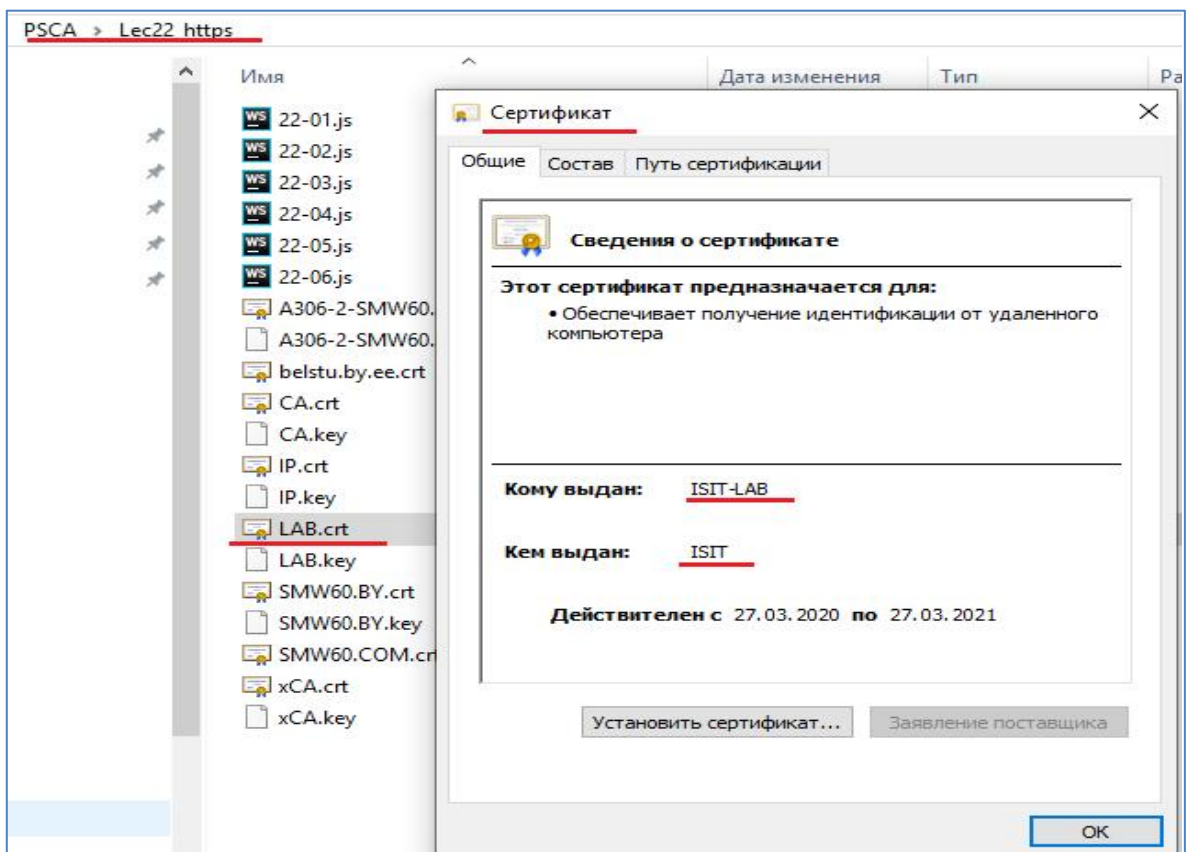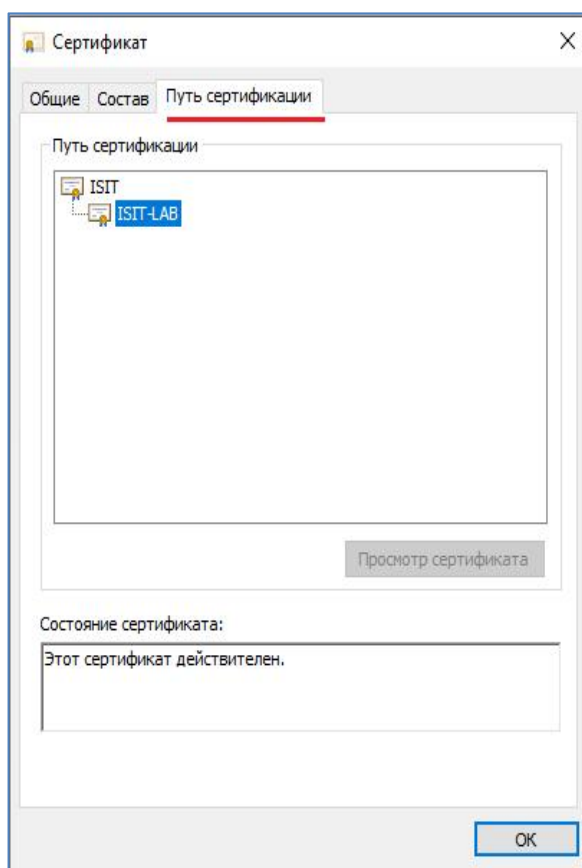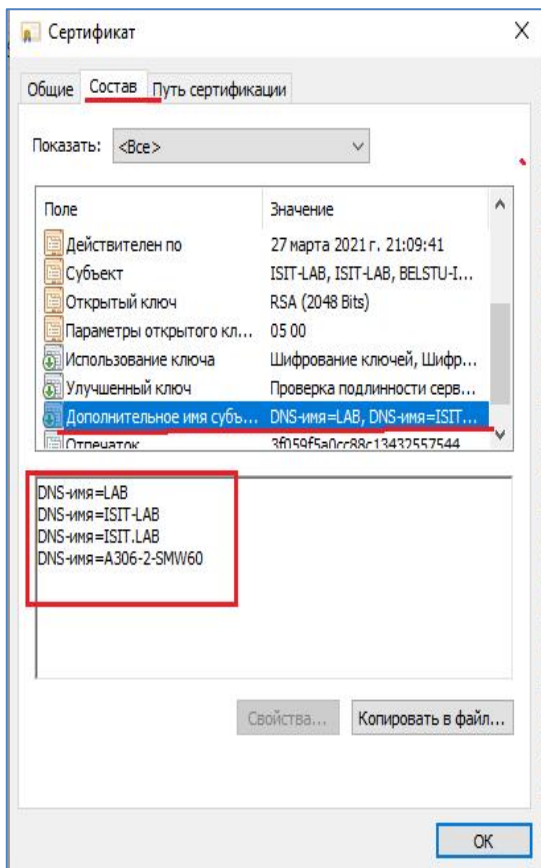**7. HTTPS:** mmc-консоль с оснасткой для работы с хранилищем сертификатов
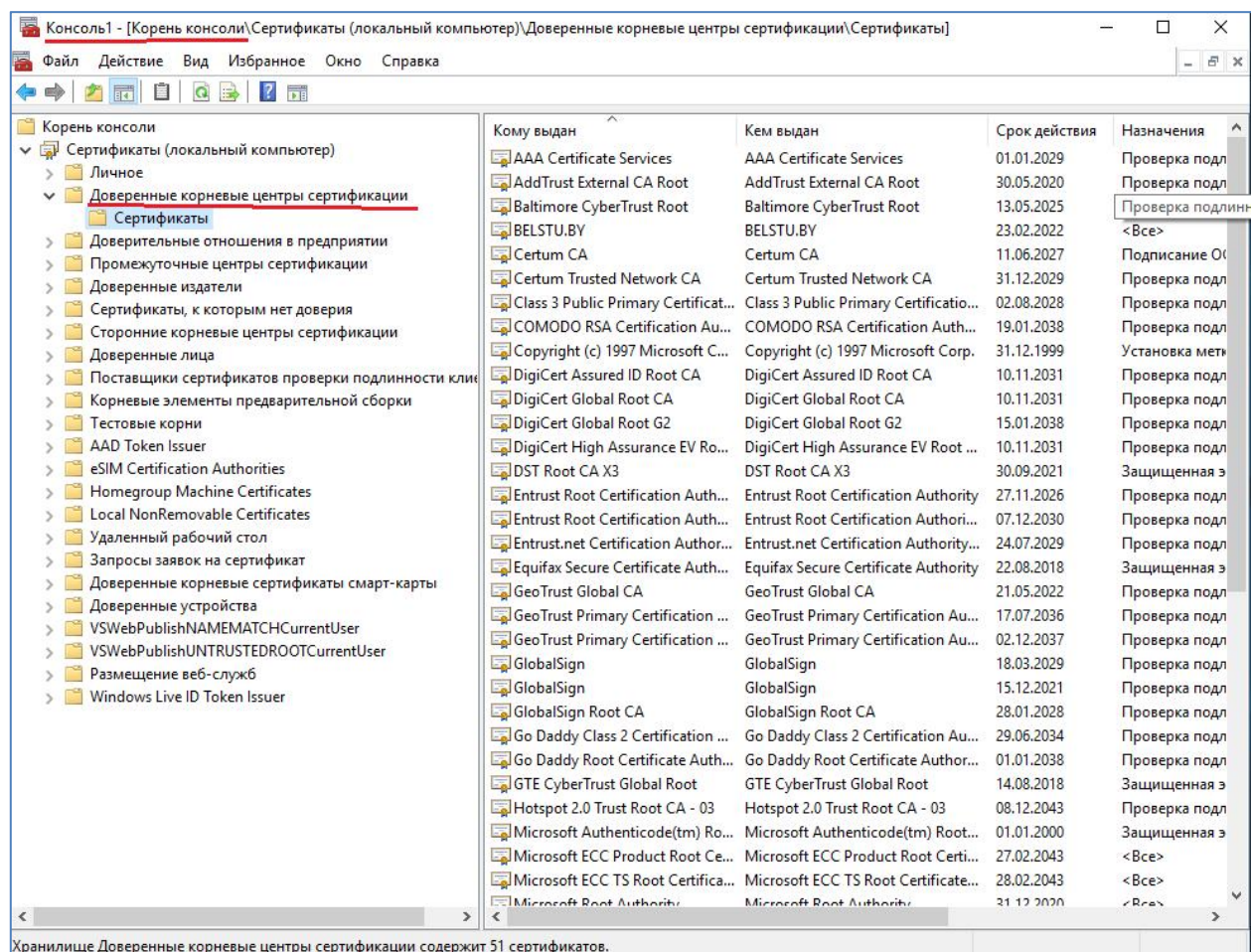
8. HTTPS: импорт сертификата CA в хранилище доверенных корневых центров сертификации
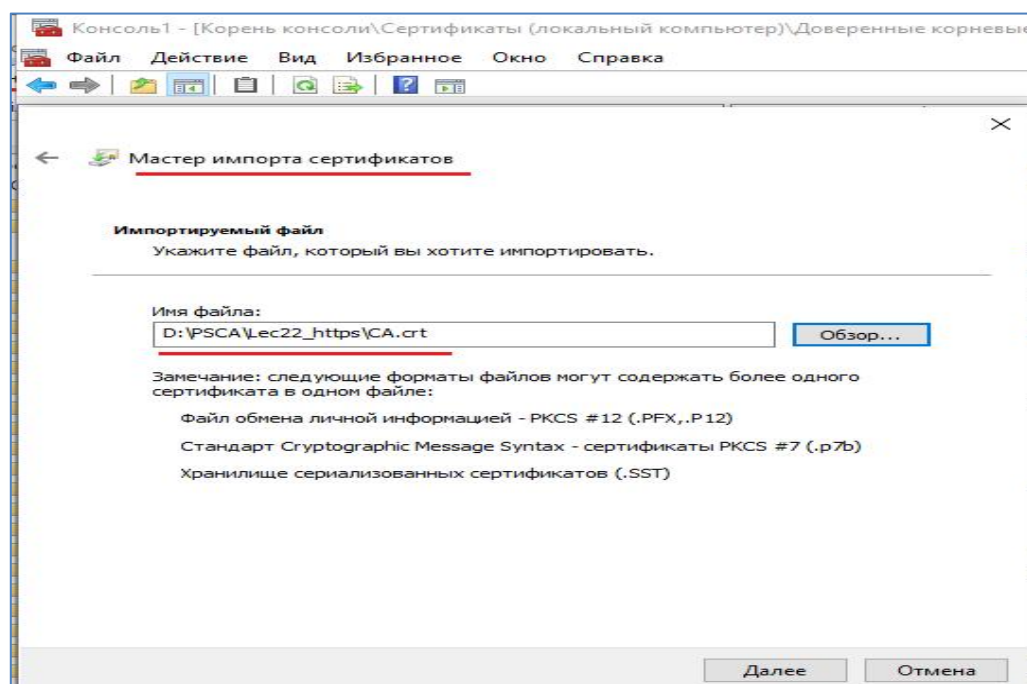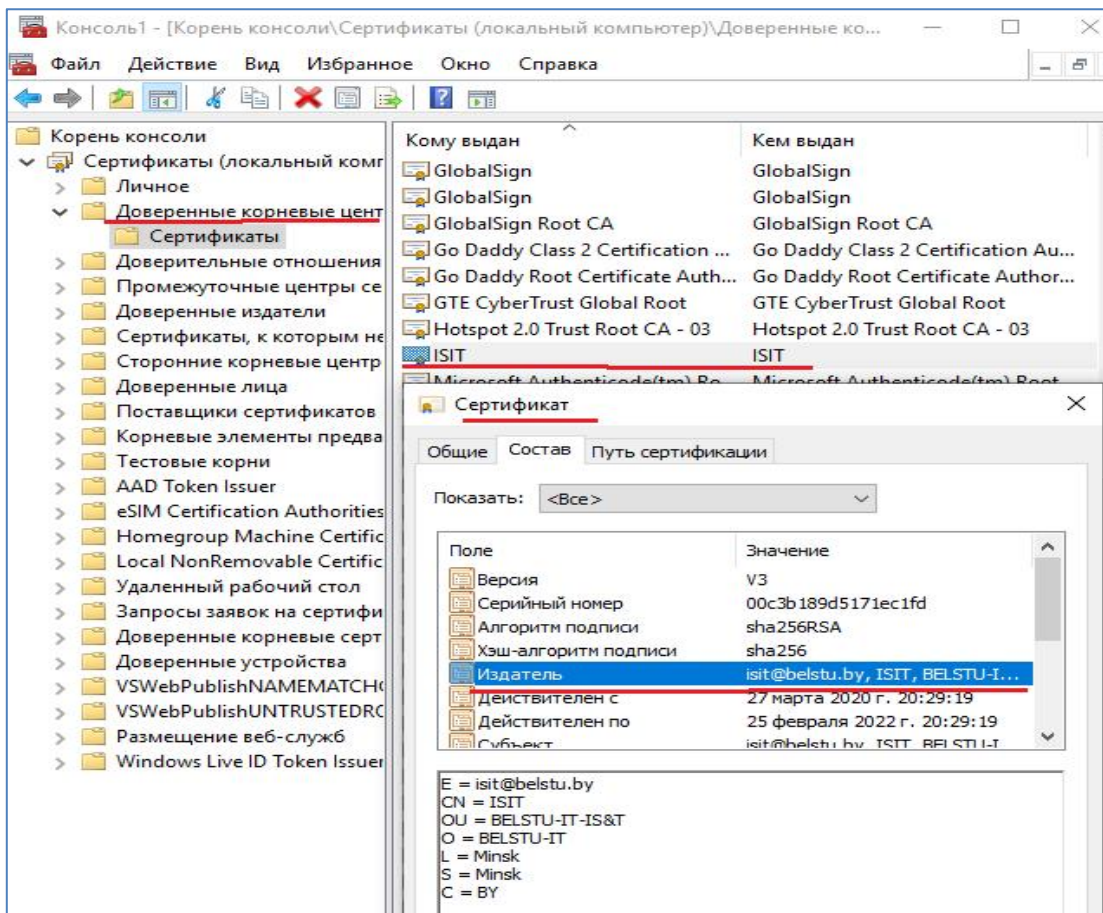
9. HTTPS: размещение сертификата ресурса и его секретного ключа в директории приложения

10. HTTPS: настройка DNS (hosts)

11. HTTPS: настройка прокси-сервера (это только для демонстрации)

Прокси-сервер

Использовать прокси-сервер

⬤ Вкл.

Адрес
172.16.192.254

Порт
3128

Не использовать прокси-сервер для адресов, которые начинаются с указанных ниже записей. Для разделения записей используйте точку с запятой (;)
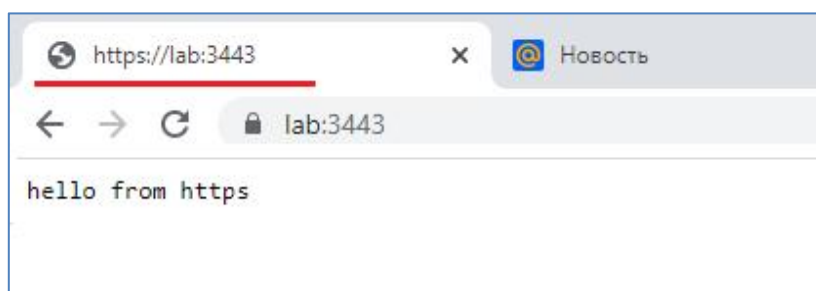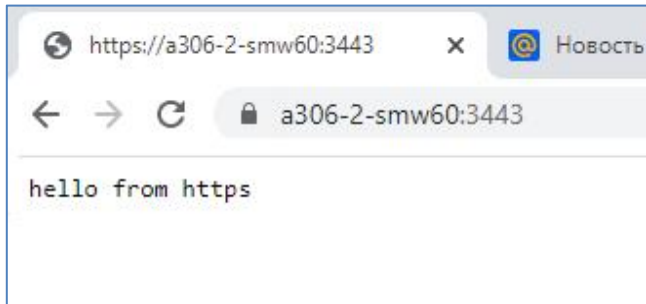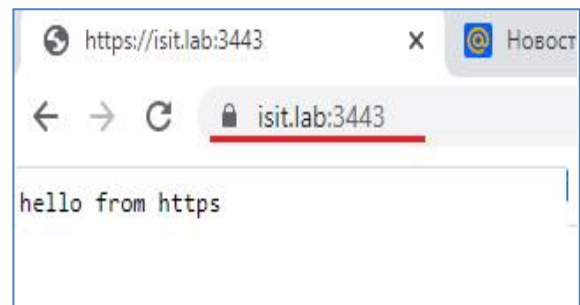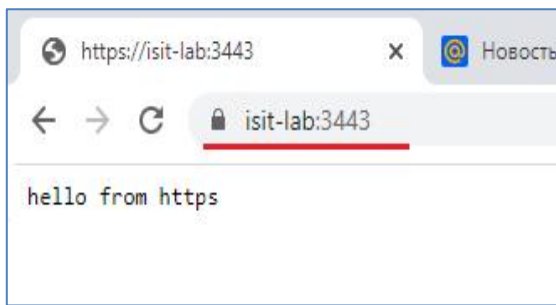
LAB; ISIT-LAB; ISIT.LAB; A306-2-SMW60

12. HTTPS: простейший https-сервер

```
let https   =   require('https');
let fs      =   require('fs');

let options = {
            key:  fs.readFileSync('LAB.key'),
            cert: fs.readFileSync('LAB.crt')
};

https.createServer(options, (req, res)=>{

        console.log('hello from https');
        res.end('hello from https');

}).listen(3443);
```

https://lab:3443   ×   @ Новость

← → C   🔒 lab:3443

hello from https

13. **HTTPS**: Express

```javascript
let app        =   require('express')();
let https      =   require('https');
let fs         =   require('fs');

let options = {
                key:  fs.readFileSync('SMW60_SERVER.key').toString(),
                cert: fs.readFileSync('SMW60_SERVER.crt').toString()
};

https.createServer(options, app).listen(3443);

app.use((req, res, next)=>{
    console.log('middleware 1');
    next();
});

app.get('/',(req, res, next)=>{

    console.log('middleware 2');
    res.end('hello from https');
})
```

14.
15.