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Examples of S/MIME Messages

Status of This Memo

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Abstract

This document gives examples of message bodies formatted using S/MIME. Specifically, it has examples of Cryptographic Message Syntax (CMS) objects and S/MIME messages (including the MIME formatting). It includes examples of many common CMS formats. The purpose of this document is to help increase interoperability for S/MIME and other protocols that rely on CMS.

Table of Contents

1. Introduction

The examples in this document show the structure and format of CMS message bodies, as described in [CMS]. They are useful to implementors who use protocols that rely on CMS, such as the S/MIME message format protocol. There are also examples of simple S/MIME messages [SMIME-MSG] (including the MIME headers).

Every example in this document has been checked by two different implementors. This strongly indicates (but does not assure) that the examples are correct. All CMS implementors must read the CMS document carefully before implementing from it. No one should use the examples in this document as stand-alone explanations of how to create CMS message bodies.

This document explicitly does not attempt to cover many PKIX [PKIX] examples. Documents with examples of that format may be forthcoming. Also, note that [DVCS], which covers PKIX Data Validation and Certification Server Protocols, has examples of formats for its protocol.

The examples shown here were created and validated by many different people over a long period of time. Because of this, some of the dates used in the examples are many years in the past. This, plus the fact that some of the certificates in the examples have very long lifespans, may cause problems in some test situations.

2. Constants Used in the Examples

This section defines the data used in the rest of the document. The names of the constants indicate their use. For example, AlicePrivDSSSign is the private part of Alice’s DSS signing key.

- Alice is the creator of the message bodies in this document.

- Bob is the recipient of the messages.

- Carl is a CA.

- Diane sometimes gets involved with these folks.

- Erica also sometimes gets involved.

2.1. Content of Documents

ExContent is the following sentence:

> This is some sample content.

That is, it is the string of characters starting with "T" up to and including the ".".

The hex for ExContent is

```
5468 6973 2069 7320 736f 6d65 2073 616d 706c 6520 636f 6e74 656e 742e
```

The MD5 hash of ExContent is

```
9898 cac8 fab7 691f f89d c207 24e7 4a04
```

The SHA-1 hash of ExContent is

```
406a ec08 5279 ba6e 1602 2d9e 0629 c022 9687 dd48
```

2.2. Private Keys

The following private keys are needed to create the samples. To find the public keys, see the certificates in the next section.

```
AlicePrivDSSSign =
   0 30  331: SEQUENCE {
   4 02    1:   INTEGER 0
   7 30  299:   SEQUENCE {
  11 06    7:     OBJECT IDENTIFIER dsa (1 2 840 10040 4 1)
             :       (ANSI X9.57 algorithm)
  20 30  286:     SEQUENCE {
  24 02  129:       INTEGER
             :         00 81 8D CD ED 83 EA 0A 9E 39 3E C2
             :         48 28 A3 E4 47 93 DD 0E D7 A8 0E EC
             :         53 C5 AB 84 08 4F FF 94 E1 73 48 7E
             :         0C D6 F3 44 48 D1 FE 9F AF A4 A1 89
             :         2F E1 D9 30 C8 36 DE 3F 9B BF B7 4C
             :         DC 5F 69 8A E4 75 D0 37 0C 91 08 95
             :         9B DE A7 5E F9 FC F4 9F 2F DD 43 A8
             :         8B 54 F1 3F B0 07 08 47 4D 5D 88 C3
             :         C3 B5 B3 E3 55 08 75 D5 39 76 10 C4
             :         78 BD FF 9D B0 84 97 37 F2 E4 51 1B
             :         B5 E4 09 96 5C F3 7E 5B DB
 156 02   21:       INTEGER
             :         00 E2 47 A6 1A 45 66 B8 13 C6 DA 8F
             :         B8 37 21 2B 62 8B F7 93 CD
```

```
    179 02  128:       INTEGER
                :         26 38 D0 14 89 32 AA 39 FB 3E 6D D9
                :         4B 59 6A 4C 76 23 39 04 02 35 5C F2
                :         CB 1A 30 C3 1E 50 5D DD 9B 59 E2 CD
                :         AA 05 3D 58 C0 7B A2 36 B8 6E 07 AF
                :         7D 8A 42 25 A7 F4 75 CF 4A 08 5E 4B
                :         3E 90 F8 6D EA 9C C9 21 8A 3B 76 14
                :         E9 CE 2E 5D A3 07 CD 23 85 B8 2F 30
                :         01 7C 6D 49 89 11 89 36 44 BD F8 C8
                :         95 4A 53 56 B5 E2 F9 73 EC 1A 61 36
                :         1F 11 7F C2 BD ED D1 50 FF 98 74 C2
                :         D1 81 4A 60 39 BA 36 39
                :       }
                :     }
    310 04   23:   OCTET STRING, encapsulates {
    312 02   21:       INTEGER
                :         00 BB 44 46 D1 A5 C9 46 07 2E D0 FE
                :         7A D6 92 07 F0 9A 85 89 3F
                :       }
                :   }

   AlicePrivRSASign =
      0 30  630: SEQUENCE {
      4 02    1:   INTEGER 0
      7 30   13:   SEQUENCE {
      9 06    9:     OBJECT IDENTIFIER
                :       rsaEncryption (1 2 840 113549 1 1 1)
                :       (PKCS #1)
     20 05    0:     NULL
                :     }
     22 04  608:   OCTET STRING, encapsulates {
     26 30  604:       SEQUENCE {
     30 02    1:         INTEGER 0
     33 02  129:         INTEGER
                :           00 E0 89 73 39 8D D8 F5 F5 E8 87 76
                :           39 7F 4E B0 05 BB 53 83 DE 0F B7 AB
                :           DC 7D C7 75 29 0D 05 2E 6D 12 DF A6
                :           86 26 D4 D2 6F AA 58 29 FC 97 EC FA
                :           82 51 0F 30 80 BE B1 50 9E 46 44 F1
                :           2C BB D8 32 CF C6 68 6F 07 D9 B0 60
                :           AC BE EE 34 09 6A 13 F5 F7 05 05 93
                :           DF 5E BA 35 56 D9 61 FF 19 7F C9 81
                :           E6 F8 6C EA 87 40 70 EF AC 6D 2C 74
                :           9F 2D FA 55 3A B9 99 77 02 A6 48 52
                :           8C 4E F3 57 38 57 74 57 5F
    165 02    3:         INTEGER 65537
    170 02  128:         INTEGER
                :           00 A4 03 C3 27 47 76 34 34 6C A6 86
```

```
                :           B5 79 49 01 4B 2E 8A D2 C8 62 B2 C7
                :           D7 48 09 6A 8B 91 F7 36 F2 75 D6 E8
                :           CD 15 90 60 27 31 47 35 64 4D 95 CD
                :           67 63 CE B4 9F 56 AC 2F 37 6E 1C EE
                :           0E BF 28 2D F4 39 90 6F 34 D8 6E 08
                :           5B D5 65 6A D8 41 F3 13 D7 2D 39 5E
                :           FE 33 CB FF 29 E4 03 0B 3D 05 A2 8F
                :           B7 F1 8E A2 76 37 B0 79 57 D3 2F 2B
                :           DE 87 06 22 7D 04 66 5E C9 1B AF 8B
                :           1A C3 EC 91 44 AB 7F 21
    301 02   65:         INTEGER
                :           00 F6 D6 E0 22 21 4C 5F 0A 70 FF 27
                :           FC E5 B3 50 6A 9D E5 0F B5 85 96 C6
                :           40 FA A8 0A B4 9B 9B 0C 55 C2 01 1D
                :           F9 37 82 8A 14 C8 F2 93 0E 92 CD A5
                :           66 21 B9 3C D2 06 BF B4 55 31 C9 DC
                :           AD CA 98 2D D1
    368 02   65:         INTEGER
                :           00 E8 DE B0 11 25 09 D2 02 51 01 DE
                :           8A E8 98 50 F5 77 77 61 A4 45 93 6B
                :           08 55 96 73 5D F4 C8 5B 12 93 22 73
                :           8B 7F D3 70 7F F5 A4 AA BB 74 FD 3C
                :           22 6A DA 38 91 2A 86 5B 6C 14 E8 AE
                :           4C 9E FA 8E 2F
    435 02   65:         INTEGER
                :           00 97 4C F0 87 9B 17 7F EE 1B 83 1B
                :           14 B6 0B 6A 90 5F 86 27 51 E1 B7 A0
                :           7F F5 E4 88 E3 59 B9 F9 1E 9B D3 29
                :           77 38 22 48 D7 22 B1 25 98 BA 3D 59
                :           53 B7 FA 1E 20 B2 C8 51 16 23 75 93
                :           51 E7 AB CD F1
    502 02   64:         INTEGER
                :           2C F0 24 5B FA A0 CD 85 22 EA D0 6E
                :           4F FA 6C CD 21 D3 C8 E4 F1 84 44 48
                :           64 73 D7 29 8F 7E 46 8C EC 15 DE E4
                :           51 B3 94 E7 2C 99 2D 55 65 7B 24 EA
                :           A3 62 1F 3E 6C 4D 67 41 11 3B E1 BE
                :           E9 83 02 83
    568 02   64:         INTEGER
                :           58 88 D9 A1 50 38 84 6A AB 03 BC BB
                :           DF 4B F4 9C 6F B8 B4 2A 25 FB F6 E4
                :           05 2F 6E E2 88 89 21 6F 4B 25 9E D0
                :           AB 50 93 CA BF 40 71 EC 21 25 C5 7F
                :           FB 02 E9 21 96 B8 33 CD E2 C6 95 EE
                :           6F 8D 5F 28
                :         }
                :       }
                :   }
```

```
   BobPrivRSAEncrypt =
      0 30  645: SEQUENCE {
      4 02    1:   INTEGER 0
      7 30   13:   SEQUENCE {
      9 06    9:     OBJECT IDENTIFIER
              :       rsaEncryption (1 2 840 113549 1 1 1)
              :       (PKCS #1)
     20 05    0:     NULL
              :     }
     22 04  608:   OCTET STRING, encapsulates {
     26 30  604:     SEQUENCE {
     30 02    1:       INTEGER 0
     33 02  129:       INTEGER
              :         00 A9 E1 67 98 3F 39 D5 5F F2 A0 93
              :         41 5E A6 79 89 85 C8 35 5D 9A 91 5B
              :         FB 1D 01 DA 19 70 26 17 0F BD A5 22
              :         D0 35 85 6D 7A 98 66 14 41 5C CF B7
              :         B7 08 3B 09 C9 91 B8 19 69 37 6D F9
              :         65 1E 7B D9 A9 33 24 A3 7F 3B BB AF
              :         46 01 86 36 34 32 CB 07 03 59 52 FC
              :         85 8B 31 04 B8 CC 18 08 14 48 E6 4F
              :         1C FB 5D 60 C4 E0 5C 1F 53 D3 7F 53
              :         D8 69 01 F1 05 F8 7A 70 D1 BE 83 C6
              :         5F 38 CF 1C 2C AA 6A A7 EB
    165 02    3:       INTEGER 65537
    170 02  128:       INTEGER
              :         67 CD 48 4C 9A 0D 8F 98 C2 1B 65 FF
              :         22 83 9C 6D F0 A6 06 1D BC ED A7 03
              :         88 94 F2 1C 6B 0F 8B 35 DE 0E 82 78
              :         30 CB E7 BA 6A 56 AD 77 C6 EB 51 79
              :         70 79 0A A0 F4 FE 45 E0 A9 B2 F4 19
              :         DA 87 98 D6 30 84 74 E4 FC 59 6C C1
              :         C6 77 DC A9 91 D0 7C 30 A0 A2 C5 08
              :         5E 21 71 43 FC 0D 07 3D F0 FA 6D 14
              :         9E 4E 63 F0 17 58 79 1C 4B 98 1C 3D
              :         3D B0 1B DF FA 25 3B A3 C0 2C 98 05
              :         F6 10 09 D8 87 DB 03 19
    301 02   65:       INTEGER
              :         00 D0 C3 22 C6 DE A2 99 18 76 8F 8D
              :         BC A6 75 D6 66 3F D4 8D 45 52 8C 76
              :         F5 72 C4 EB F0 46 9A F1 3E 5C AA 55
              :         0B 9B DA DD 6B 6D F8 FC 3B 3C 08 43
              :         93 B5 5B FE CE EA FD 68 84 23 62 AF
              :         F3 31 C2 B9 E5
    368 02   65:       INTEGER
              :         00 D0 51 FC 1E 22 B7 5B ED B5 8E 01
              :         C8 D7 AB F2 58 D4 F7 82 94 F3 53 A8
              :         19 45 CB 66 CA 28 19 5F E2 10 2B F3
```

```
                :           8F EC 6A 30 74 F8 4D 11 F4 A7 C4 20
                :           B5 47 21 DC 49 01 F9 0A 20 29 F0 24
                :           08 84 60 7D 8F
    435 02   64:         INTEGER
                :           34 BA 64 C9 48 28 57 74 D7 55 50 DE
                :           6A 48 EF 1B 2A 5A 1C 48 7B 1E 21 59
                :           C3 60 3B 9B 97 A9 C0 EF 18 66 A9 4E
                :           62 52 38 84 CE E5 09 88 48 94 69 C5
                :           20 14 99 5A 57 FE 23 6C E4 A7 23 7B
                :           D0 80 B7 85
    501 02   65:         INTEGER
                :           00 9E 2F B3 37 9A FB 0B 06 5D 57 E1
                :           09 06 A4 5D D9 90 96 06 05 5F 24 06
                :           40 72 9C 3A 88 85 9C 87 0F 9D 62 12
                :           88 16 68 A8 35 1A 1B 43 E8 38 C0 98
                :           69 AF 03 0A 48 32 04 4E E9 0F 8F 77
                :           7D 34 30 25 07
    568 02   64:         INTEGER
                :           57 18 67 D6 0A D2 B5 AB C2 BA 7A E7
                :           54 DA 9C 05 4F 81 D4 EF 01 89 1E 32
                :           3D 69 CB 31 C4 52 C8 54 55 25 00 3B
                :           1C 2A 7C 26 50 D5 E9 A6 D7 77 CB CF
                :           15 F5 EE 0B D5 8D EE B3 AF 4C A1 7C
                :           63 46 41 F6
                :         }
                :       }
    634 A0   13:   [0] {
    636 30   11:     SEQUENCE {
    638 06    3:       OBJECT IDENTIFIER keyUsage (2 5 29 15)
                :         (X.509 id-ce (2 5 29))
    643 31    4:       SET {
    645 03    2:         BIT STRING 0 unused bits
                :           '00001000'B (bit 3)
                :           Error: Spurious zero bits in bitstring.
                :         }
                :       }
                :     }
                :   }

   CarlPrivDSSSign =
      0 30  330: SEQUENCE {
      4 02    1:   INTEGER 0
      7 30  299:   SEQUENCE {
     11 06    7:     OBJECT IDENTIFIER dsa (1 2 840 10040 4 1)
                :       (ANSI X9.57 algorithm)
     20 30  286:     SEQUENCE {
     24 02  129:       INTEGER
                :         00 B6 49 18 3E 8A 44 C1 29 71 94 4C
```

```
                :         01 C4 12 C1 7A 79 CB 54 4D AB 1E 81
                :         FB C6 4C B3 0E 94 09 06 EB 01 D4 B1
                :         C8 71 4B C7 45 C0 50 25 5D 9C FC DA
                :         E4 6D D3 E2 86 48 84 82 7D BA 15 95
                :         4A 16 F6 46 ED DD F6 98 D2 BB 7E 8A
                :         0A 8A BA 16 7B B9 50 01 48 93 8B EB
                :         25 15 51 97 55 DC 8F 53 0E 10 A9 50
                :         FC 70 B7 CD 30 54 FD DA DE A8 AA 22
                :         B5 A1 AF 8B CC 02 88 E7 8B 70 5F B9
                :         AD E1 08 D4 6D 29 2D D6 E9
    156 02   21:       INTEGER
                :         00 DD C1 2F DF 53 CE 0B 34 60 77 3E
                :         02 A4 BF 8A 5D 98 B9 10 D5
    179 02  128:       INTEGER
                :         0C EE 57 9B 4B BD DA B6 07 6A 74 37
                :         4F 55 7F 9D ED BC 61 0D EB 46 59 3C
                :         56 0B 2B 5B 0C 91 CE A5 62 52 69 CA
                :         E1 6D 3E BD BF FE E1 B7 B9 2B 61 3C
                :         AD CB AE 45 E3 06 AC 8C 22 9D 9C 44
                :         87 0B C7 CD F0 1C D9 B5 4E 5D 73 DE
                :         AF 0E C9 1D 5A 51 F5 4F 44 79 35 5A
                :         73 AA 7F 46 51 1F A9 42 16 9C 48 EB
                :         8A 79 61 B4 D5 2F 53 22 44 63 1F 86
                :         B8 A3 58 06 25 F8 29 C0 EF BA E0 75
                :         F0 42 C4 63 65 52 9B 0A
                :       }
                :     }
    310 04   22:   OCTET STRING, encapsulates {
    312 02   20:       INTEGER
                :         19 B3 38 A5 21 62 31 50 E5 7F B9 3E
                :         08 46 78 D1 3E B5 E5 72
                :       }
                :   }

   CarlPrivRSASign =
      0 30  630: SEQUENCE {
      4 02    1:   INTEGER 0
      7 30   13:   SEQUENCE {
      9 06    9:     OBJECT IDENTIFIER
                :       rsaEncryption (1 2 840 113549 1 1 1)
                :       (PKCS #1)
     20 05    0:     NULL
                :     }
     22 04  608:   OCTET STRING, encapsulates {
     26 30  604:       SEQUENCE {
     30 02    1:         INTEGER 0
     33 02  129:         INTEGER
                :           00 E4 4B FF 18 B8 24 57 F4 77 FF 6E
```

```
                :           73 7B 93 71 5C BC 33 1A 92 92 72 23
                :           D8 41 46 D0 CD 11 3A 04 B3 8E AF 82
                :           9D BD 51 1E 17 7A F2 76 2C 2B 86 39
                :           A7 BD D7 8D 1A 53 EC E4 00 D5 E8 EC
                :           A2 36 B1 ED E2 50 E2 32 09 8A 3F 9F
                :           99 25 8F B8 4E AB B9 7D D5 96 65 DA
                :           16 A0 C5 BE 0E AE 44 5B EF 5E F4 A7
                :           29 CB 82 DD AC 44 E9 AA 93 94 29 0E
                :           F8 18 D6 C8 57 5E F2 76 C4 F2 11 60
                :           38 B9 1B 3C 1D 97 C9 6A F1
    165 02    3:         INTEGER 65537
    170 02  129:         INTEGER
                :           00 AE 73 E4 5B 5F 5B 66 5A C9 D7 C6
                :           EF 38 5F 53 21 2A 2F 62 FE DE 29 9A
                :           7A 86 67 36 E7 7D 62 78 75 3D 73 A0
                :           BC 29 0E F3 8F BD C3 C9 C9 B6 F8 BA
                :           D6 13 9B C3 97 7A CA 6A F0 B8 85 65
                :           4E 0F BD A7 A8 F7 54 06 41 BD EB DC
                :           20 77 90 DF 61 9B 9A 6F 74 DE EA 3B
                :           D4 9C 87 60 ED 76 84 F1 6A 30 37 D5
                :           E0 90 16 F8 80 47 C3 19 6B ED 75 77
                :           BA 4A ED 39 B6 5D 02 47 3B 5F 1B C8
                :           1C AB CB E8 F5 26 3F A4 81
    302 02   65:         INTEGER
                :           00 FF DF 09 A0 56 0B 42 52 9E C4 4D
                :           93 B3 B0 49 BB DE E7 81 7D 28 99 D0
                :           B1 48 BA 0B 39 E1 1C 7B 22 18 33 B6
                :           40 F6 BF DC AE 1D D0 A1 AD 04 71 5A
                :           61 0A 6E 3B CE 30 DA 36 9F 65 25 29
                :           BB A7 0E 7F 0B
    369 02   65:         INTEGER
                :           00 E4 69 68 18 5F F9 57 D0 7C 66 89
                :           0F BA 63 1D 72 CB 20 A4 81 76 64 89
                :           CD 7D D1 C2 27 A9 2E AC 7A 56 9A 85
                :           07 D9 30 03 A3 03 AB 7F 88 92 50 24
                :           01 AA 1B 07 1F 20 4C B7 C9 7B 56 F7
                :           B6 C2 7E AB 73
    436 02   64:         INTEGER
                :           57 36 6C 8F 8C 04 76 6C B6 D4 EE 24
                :           44 00 F8 80 E2 AF 42 01 A9 0F 14 84
                :           F8 E7 00 E0 8F 8C 27 A4 2D 5F A2 E5
                :           6D B5 63 C0 AD 44 E9 76 91 A7 19 49
                :           2E 46 F8 77 85 4B 3B 87 04 F0 AF D2
                :           D8 54 26 95
    502 02   64:         INTEGER
                :           64 A1 0F AC 55 74 1B BD 0D 61 7B 17
                :           03 CD B0 E6 A7 19 1D 80 AF F1 41 48
                :           D8 1A B6 88 14 A0 2C 7A C5 76 D4 0F
```

```
               :           0E 1F 7A 2A B2 6E 37 04 AB 39 45 73
               :           BA 46 A8 0F 8D 82 5F 22 14 05 CF A2
               :           A3 F3 7C 83
    568 02   64:         INTEGER
               :           26 1E 1D 1C A1 98 2B E4 DB 38 E8 57
               :           6E 6B 73 19 88 61 3A FA 74 4A 36 8B
               :           47 68 5D 50 EB 26 E3 EA 7D 9B 4E 65
               :           A9 AF 7B AB 4B 2E 76 51 3D A8 D0 11
               :           AB A3 D6 A8 C0 27 36 1D 54 0B AA A7
               :           D1 6D 8D FA
               :         }
               :       }
               :   }

   DianePrivDSSSign =
      0 30  331: SEQUENCE {
      4 02    1:   INTEGER 0
      7 30  299:   SEQUENCE {
     11 06    7:     OBJECT IDENTIFIER dsa (1 2 840 10040 4 1)
               :       (ANSI X9.57 algorithm)
     20 30  286:     SEQUENCE {
     24 02  129:       INTEGER
               :         00 B6 49 18 3E 8A 44 C1 29 71 94 4C
               :         01 C4 12 C1 7A 79 CB 54 4D AB 1E 81
               :         FB C6 4C B3 0E 94 09 06 EB 01 D4 B1
               :         C8 71 4B C7 45 C0 50 25 5D 9C FC DA
               :         E4 6D D3 E2 86 48 84 82 7D BA 15 95
               :         4A 16 F6 46 ED DD F6 98 D2 BB 7E 8A
               :         0A 8A BA 16 7B B9 50 01 48 93 8B EB
               :         25 15 51 97 55 DC 8F 53 0E 10 A9 50
               :         FC 70 B7 CD 30 54 FD DA DE A8 AA 22
               :         B5 A1 AF 8B CC 02 88 E7 8B 70 5F B9
               :         AD E1 08 D4 6D 29 2D D6 E9
    156 02   21:       INTEGER
               :         00 DD C1 2F DF 53 CE 0B 34 60 77 3E
               :         02 A4 BF 8A 5D 98 B9 10 D5
    179 02  128:       INTEGER
               :         0C EE 57 9B 4B BD DA B6 07 6A 74 37
               :         4F 55 7F 9D ED BC 61 0D EB 46 59 3C
               :         56 0B 2B 5B 0C 91 CE A5 62 52 69 CA
               :         E1 6D 3E BD BF FE E1 B7 B9 2B 61 3C
               :         AD CB AE 45 E3 06 AC 8C 22 9D 9C 44
               :         87 0B C7 CD F0 1C D9 B5 4E 5D 73 DE
               :         AF 0E C9 1D 5A 51 F5 4F 44 79 35 5A
               :         73 AA 7F 46 51 1F A9 42 16 9C 48 EB
               :         8A 79 61 B4 D5 2F 53 22 44 63 1F 86
               :         B8 A3 58 06 25 F8 29 C0 EF BA E0 75
               :         F0 42 C4 63 65 52 9B 0A
```

```
                :       }
                :     }
    310 04   23:   OCTET STRING, encapsulates {
    312 02   21:     INTEGER
                :       00 96 95 F9 E0 C1 E0 41 2D 32 0F 8B
                :       42 52 93 2A E6 1E 0E 21 29
                :     }
                :   }

   DianePrivRSASignEncrypt =
      0 30  631: SEQUENCE {
      4 02    1:   INTEGER 0
      7 30   13:   SEQUENCE {
      9 06    9:     OBJECT IDENTIFIER
                :       rsaEncryption (1 2 840 113549 1 1 1)
                :       (PKCS #1)
     20 05    0:     NULL
                :     }
     22 04  609:   OCTET STRING, encapsulates {
     26 30  605:     SEQUENCE {
     30 02    1:       INTEGER 0
     33 02  129:       INTEGER
                :         00 D6 FD B8 C0 70 C6 4C 25 EC EA CF
                :         EA 7C BB A2 62 FA F0 E6 32 3A 53 FF
                :         B1 92 5A 17 F4 20 E1 99 24 82 0A D0
                :         F6 7C FB 44 CA 8B 27 06 F1 7E 26 03
                :         A9 76 9D CF EC A0 2C 70 96 F2 83 42
                :         F6 D4 B7 28 0A BB F8 BF 4A 4C 19 3F
                :         07 DB A0 C1 60 1E B7 7E 67 F7 DE B1
                :         C3 60 49 AC 45 D7 F8 C6 EF 08 37 21
                :         93 47 EE F0 73 35 72 B0 02 C4 F3 11
                :         C3 5E 47 E5 0A B7 83 F1 DB 74 69 64
                :         8B 44 1D 95 5D CD 28 C0 85
    165 02    3:       INTEGER 65537
    170 02  128:       INTEGER
                :         3D BD CD C2 0E 61 14 5B 4B E7 BF 60
                :         23 04 2B C5 6B 35 A5 96 45 23 FC 69
                :         7D 93 3C 0F D3 25 96 BA 62 52 42 E2
                :         96 CF FE 58 80 8F EB B1 8C BD D4 0D
                :         65 D0 3A 77 45 24 9E 0C EB 86 80 C3
                :         AC 21 11 71 44 E3 B2 A8 A9 2E AC 17
                :         D2 A3 84 25 63 B5 BC 2F 1E DD F6 21
                :         FF 15 20 24 5B F1 80 2F D5 41 0E 32
                :         24 F7 D4 4A 32 9E B9 49 D8 19 8E 3F
                :         39 8D 62 BD 80 FC 0C 24 92 93 E4 C3
                :         D7 05 91 53 BB 96 B6 41
    301 02   65:       INTEGER
                :         00 F3 B8 3F 4A D1 94 B0 91 60 13 41
```

```
                :           92 0D 8D 44 3F 77 1D FF 96 23 44 08
                :           D4 0B 70 C9 1A AF E9 90 94 F2 B0 D5
                :           5F 4F 19 85 50 A1 90 91 AE BD 05 76
                :           52 B3 22 D8 A8 7C 8E 54 7F 00 72 4F
                :           36 75 68 73 B5
    368 02   65:         INTEGER
                :           00 E1 D2 E7 11 57 06 AE 72 95 22 16
                :           AA 02 B4 5A ED 4E 9D 82 11 4F 96 3C
                :           86 C9 10 8D 56 7B 31 75 79 69 E7 75
                :           68 38 00 4B 2E D2 26 32 DD B1 E2 E0
                :           2C 54 80 0A 75 BA D1 66 96 1B B0 0E
                :           A0 7E D2 BB 91
    435 02   65:         INTEGER
                :           00 AF B6 BC DB 22 73 43 41 EC B4 B5
                :           67 A9 A1 99 FC EF D2 8E FD 1D FB E5
                :           29 8B FE 0A DF D4 C8 5E 57 25 0A 5D
                :           2B D4 09 A0 56 5B C5 B1 62 FC 20 BE
                :           08 2D E3 07 B5 A1 E7 B3 FF C4 C0 A5
                :           5F AC 12 5C A9
    502 02   65:         INTEGER
                :           00 B9 98 41 FC 08 50 1F 73 60 8A 01
                :           A2 7C 52 8A 20 5A EA 2C 89 D9 A5 19
                :           DD 94 C6 1B C3 25 C0 82 51 E4 EE 2B
                :           9A 19 DC 73 ED E9 1D 27 D4 F8 6C 03
                :           DD AB 1D 08 7B B5 AC 7F E9 82 9B F1
                :           89 8A 71 DB 61
    569 02   64:         INTEGER
                :           01 07 21 97 5F 7A 60 A8 FD 5A 5C 07
                :           DF A8 DE F7 E2 B1 34 7D FC EB 91 BD
                :           B0 73 74 C8 C4 BE 3F 58 45 30 06 90
                :           B3 AC 69 CC B3 F7 3F 7C AC C7 B8 1B
                :           65 A1 16 39 39 B0 E3 74 7D CF CD C5
                :           AC 6C BF E5
                :         }
                :       }
                :   }
```

2.3. Certificates

```
   AliceDSSSignByCarlNoInherit =
      0 30  732: SEQUENCE {
      4 30  667:   SEQUENCE {
      8 A0    3:     [0] {
     10 02    1:       INTEGER 2
              :       }
     13 02    2:     INTEGER 200
     17 30    9:     SEQUENCE {
     19 06    7:       OBJECT IDENTIFIER dsaWithSha1 (1 2 840 10040 4 3)
```

```
                :         (ANSI X9.57 algorithm)
                :       }
     28 30   18:     SEQUENCE {
     30 31   16:       SET {
     32 30   14:         SEQUENCE {
     34 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
                :             (X.520 id-at (2 5 4))
     39 13    7:           PrintableString 'CarlDSS'
                :           }
                :         }
                :       }
     48 30   30:     SEQUENCE {
     50 17   13:       UTCTime '990817011049Z'
     65 17   13:       UTCTime '3912312359592'
                :       }
     80 30   19:     SEQUENCE {
     82 31   17:       SET {
     84 30   15:         SEQUENCE {
     86 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
                :             (X.520 id-at (2 5 4))
     91 13    8:           PrintableString 'AliceDSS'
                :           }
                :         }
                :       }
    101 30  438:     SEQUENCE {
    105 30  299:       SEQUENCE {
    109 06    7:         OBJECT IDENTIFIER dsa (1 2 840 10040 4 1)
                :           (ANSI X9.57 algorithm)
    118 30  286:         SEQUENCE {
    122 02  129:           INTEGER
                :             00 81 8D CD ED 83 EA 0A 9E 39 3E C2
                :             48 28 A3 E4 47 93 DD 0E D7 A8 0E EC
                :             53 C5 AB 84 08 4F FF 94 E1 73 48 7E
                :             0C D6 F3 44 48 D1 FE 9F AF A4 A1 89
                :             2F E1 D9 30 C8 36 DE 3F 9B BF B7 4C
                :             DC 5F 69 8A E4 75 D0 37 0C 91 08 95
                :             9B DE A7 5E F9 FC F4 9F 2F DD 43 A8
                :             8B 54 F1 3F B0 07 08 47 4D 5D 88 C3
                :             C3 B5 B3 E3 55 08 75 D5 39 76 10 C4
                :             78 BD FF 9D B0 84 97 37 F2 E4 51 1B
                :             B5 E4 09 96 5C F3 7E 5B DB
    254 02   21:           INTEGER
                :             00 E2 47 A6 1A 45 66 B8 13 C6 DA 8F
                :             B8 37 21 2B 62 8B F7 93 CD
    277 02  128:           INTEGER
                :             26 38 D0 14 89 32 AA 39 FB 3E 6D D9
                :             4B 59 6A 4C 76 23 39 04 02 35 5C F2
                :             CB 1A 30 C3 1E 50 5D DD 9B 59 E2 CD
```

```
                :             AA 05 3D 58 C0 7B A2 36 B8 6E 07 AF
                :             7D 8A 42 25 A7 F4 75 CF 4A 08 5E 4B
                :             3E 90 F8 6D EA 9C C9 21 8A 3B 76 14
                :             E9 CE 2E 5D A3 07 CD 23 85 B8 2F 30
                :             01 7C 6D 49 89 11 89 36 44 BD F8 C8
                :             95 4A 53 56 B5 E2 F9 73 EC 1A 61 36
                :             1F 11 7F C2 BD ED D1 50 FF 98 74 C2
                :             D1 81 4A 60 39 BA 36 39
                :           }
                :         }
    408 03  132:       BIT STRING 0 unused bits, encapsulates {
    412 02  128:         INTEGER
                :           5C E3 B9 5A 75 14 96 0B A9 7A DD E3
                :           3F A9 EC AC 5E DC BD B7 13 11 34 A6
                :           16 89 28 11 23 D9 34 86 67 75 75 13
                :           12 3D 43 5B 6F E5 51 BF FA 89 F2 A2
                :           1B 3E 24 7D 3D 07 8D 5B 63 C8 BB 45
                :           A5 A0 4A E3 85 D6 CE 06 80 3F E8 23
                :           7E 1A F2 24 AB 53 1A B8 27 0D 1E EF
                :           08 BF 66 14 80 5C 62 AC 65 FA 15 8B
                :           F1 BB 34 D4 D2 96 37 F6 61 47 B2 C4
                :           32 84 F0 7E 41 40 FD 46 A7 63 4E 33
                :           F2 A5 E2 F4 F2 83 E5 B8
                :         }
                :       }
    543 A3  129:     [3] {
    546 30  127:       SEQUENCE {
    548 30   12:         SEQUENCE {
    550 06    3:           OBJECT IDENTIFIER
                :             basicConstraints (2 5 29 19)
                :             (X.509 id-ce (2 5 29))
    555 01    1:           BOOLEAN TRUE
    558 04    2:           OCTET STRING, encapsulates {
    560 30    0:               SEQUENCE {}
                :               }
                :           }
    562 30   14:         SEQUENCE {
    564 06    3:           OBJECT IDENTIFIER keyUsage (2 5 29 15)
                :             (X.509 id-ce (2 5 29))
    569 01    1:           BOOLEAN TRUE
    572 04    4:           OCTET STRING, encapsulates {
    574 03    2:               BIT STRING 6 unused bits
                :                 '11'B
                :               }
                :           }
    578 30   31:         SEQUENCE {
    580 06    3:           OBJECT IDENTIFIER
                :             authorityKeyIdentifier (2 5 29 35)
```

```
                :             (X.509 id-ce (2 5 29))
    585 04   24:           OCTET STRING, encapsulates {
    587 30   22:               SEQUENCE {
    589 80   20:                 [0]
                :                   70 44 3E 82 2E 6F 87 DE 4A D3 75 E3
                :                   3D 20 BC 43 2B 93 F1 1F
                :                 }
                :               }
                :           }
    611 30   29:         SEQUENCE {
    613 06    3:           OBJECT IDENTIFIER
                :             subjectKeyIdentifier (2 5 29 14)
                :             (X.509 id-ce (2 5 29))
    618 04   22:           OCTET STRING, encapsulates {
    620 04   20:               OCTET STRING
                :                 BE 6C A1 B3 E3 C1 F7 ED 43 70 A4 CE
                :                 13 01 E2 FD E3 97 FE CD
                :               }
                :           }
    642 30   31:         SEQUENCE {
    644 06    3:           OBJECT IDENTIFIER subjectAltName (2 5 29 17)
                :             (X.509 id-ce (2 5 29))
    649 04   24:           OCTET STRING, encapsulates {
    651 30   22:               SEQUENCE {
    653 81   20:                 [1] 'AliceDSS@example.com'
                :                 }
                :               }
                :           }
                :         }
                :       }
                :     }
    675 30    9:   SEQUENCE {
    677 06    7:     OBJECT IDENTIFIER dsaWithSha1 (1 2 840 10040 4 3)
                :       (ANSI X9.57 algorithm)
                :     }
    686 03   48:   BIT STRING 0 unused bits, encapsulates {
    689 30   45:       SEQUENCE {
    691 02   20:         INTEGER
                :           55 0C A4 19 1F 42 2B 89 71 22 33 8D
                :           83 6A B5 3D 67 6B BF 45
    713 02   21:         INTEGER
                :           00 9F 61 53 52 54 0B 5C B2 DD DA E7
                :           76 1D E2 10 52 5B 43 5E BD
                :         }
                :       }
                :   }
```

AliceRSASignByCarl =

```
    0 30  556: SEQUENCE {
    4 30  405:   SEQUENCE {
    8 A0    3:     [0] {
   10 02    1:       INTEGER 2
      :       }
   13 02   16:     INTEGER
      :       46 34 6B C7 80 00 56 BC 11 D3 6E 2E
      :       C4 10 B3 B0
   31 30   13:     SEQUENCE {
   33 06    9:       OBJECT IDENTIFIER
      :         sha1withRSAEncryption (1 2 840 113549 1 1 5)
      :         (PKCS #1)
   44 05    0:       NULL
      :       }
   46 30   18:     SEQUENCE {
   48 31   16:       SET {
   50 30   14:         SEQUENCE {
   52 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
      :             (X.520 id-at (2 5 4))
   57 13    7:           PrintableString 'CarlRSA'
      :           }
      :         }
      :       }
   66 30   30:     SEQUENCE {
   68 17   13:       UTCTime '990919010847Z'
   83 17   13:       UTCTime '3912312359592'
      :       }
   98 30   19:     SEQUENCE {
  100 31   17:       SET {
  102 30   15:         SEQUENCE {
  104 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
      :             (X.520 id-at (2 5 4))
  109 13    8:           PrintableString 'AliceRSA'
      :           }
      :         }
      :       }
  119 30  159:     SEQUENCE {
  122 30   13:       SEQUENCE {
  124 06    9:         OBJECT IDENTIFIER
      :           rsaEncryption (1 2 840 113549 1 1 1)
      :           (PKCS #1)
  135 05    0:         NULL
      :         }
  137 03  141:       BIT STRING 0 unused bits, encapsulates {
  141 30  137:         SEQUENCE {
  144 02  129:           INTEGER
      :             00 E0 89 73 39 8D D8 F5 F5 E8 87 76
      :             39 7F 4E B0 05 BB 53 83 DE 0F B7 AB
```

```
                :              DC 7D C7 75 29 0D 05 2E 6D 12 DF A6
                :              86 26 D4 D2 6F AA 58 29 FC 97 EC FA
                :              82 51 0F 30 80 BE B1 50 9E 46 44 F1
                :              2C BB D8 32 CF C6 68 6F 07 D9 B0 60
                :              AC BE EE 34 09 6A 13 F5 F7 05 05 93
                :              DF 5E BA 35 56 D9 61 FF 19 7F C9 81
                :              E6 F8 6C EA 87 40 70 EF AC 6D 2C 74
                :              9F 2D FA 55 3A B9 99 77 02 A6 48 52
                :              8C 4E F3 57 38 57 74 57 5F
    276 02    3:            INTEGER 65537
                :            }
                :          }
                :        }
    281 A3  129:       [3] {
    284 30  127:         SEQUENCE {
    286 30   12:           SEQUENCE {
    288 06    3:             OBJECT IDENTIFIER
                :               basicConstraints (2 5 29 19)
                :               (X.509 id-ce (2 5 29))
    293 01    1:             BOOLEAN TRUE
    296 04    2:             OCTET STRING, encapsulates {
    298 30    0:                 SEQUENCE {}
                :                 }
                :             }
    300 30   14:           SEQUENCE {
    302 06    3:             OBJECT IDENTIFIER keyUsage (2 5 29 15)
                :               (X.509 id-ce (2 5 29))
    307 01    1:             BOOLEAN TRUE
    310 04    4:             OCTET STRING, encapsulates {
    312 03    2:                 BIT STRING 6 unused bits
                :                   '11'B
                :                 }
                :             }
    316 30   31:           SEQUENCE {
    318 06    3:             OBJECT IDENTIFIER
                :               authorityKeyIdentifier (2 5 29 35)
                :               (X.509 id-ce (2 5 29))
    323 04   24:             OCTET STRING, encapsulates {
    325 30   22:                 SEQUENCE {
    327 80   20:                   [0]
                :                     E9 E0 90 27 AC 78 20 7A 9A D3 4C F2
                :                     42 37 4E 22 AE 9E 38 BB
                :                   }
                :                 }
                :             }
    349 30   29:           SEQUENCE {
    351 06    3:             OBJECT IDENTIFIER
                :               subjectKeyIdentifier (2 5 29 14)
```

```
                :             (X.509 id-ce (2 5 29))
    356 04   22:           OCTET STRING, encapsulates {
    358 04   20:               OCTET STRING
                :                 77 D2 B4 D1 B7 4C 8A 8A A3 CE 45 9D
                :                 CE EC 3C A0 3A E3 FF 50
                :               }
                :           }
    380 30   31:         SEQUENCE {
    382 06    3:           OBJECT IDENTIFIER subjectAltName (2 5 29 17)
                :             (X.509 id-ce (2 5 29))
    387 04   24:           OCTET STRING, encapsulates {
    389 30   22:               SEQUENCE {
    391 81   20:                 [1] 'AliceRSA@example.com'
                :                 }
                :               }
                :           }
                :         }
                :       }
    413 30   13:   SEQUENCE {
    415 06    9:     OBJECT IDENTIFIER
                :       sha1withRSAEncryption (1 2 840 113549 1 1 5)
                :       (PKCS #1)
    426 05    0:     NULL
                :     }
    428 03  129:   BIT STRING 0 unused bits
                :     3E 70 47 A8 48 CC 13 58 8F CA 51 71
                :     6B 4E 36 18 5D 04 7E 80 B1 8D 4D CC
                :     CA A3 8F CC 7D 56 C8 BC CF 6E B3 1C
                :     59 A9 20 AA 05 81 A8 4E 25 AD A7 70
                :     14 75 2F F5 C7 9B D1 0E E9 63 D2 64
                :     B7 C6 66 6E 73 21 54 DF F4 BA 25 5D
                :     7D 49 D3 94 6B 22 36 74 73 B8 4A EC
                :     2F 64 ED D3 3D D2 A7 42 C5 E8 37 8A
                :     B4 DB 9F 67 E4 BD 9F F9 FE 74 EF EA
                :     F9 EE 63 6A D8 3F 4B 25 09 B5 D8 1A
                :     76 AE EB 9B DB 49 B0 22
                :   }

   BobRSASignByCarl =
      0 30  551: SEQUENCE {
      4 30  400:   SEQUENCE {
      8 A0    3:     [0] {
     10 02    1:       INTEGER 2
                :       }
     13 02   16:     INTEGER
                :       46 34 6B C7 80 00 56 BC 11 D3 6E 2E
                :       CD 5D 71 D0
```

```
 31 30   13:     SEQUENCE {
 33 06    9:       OBJECT IDENTIFIER
             :         sha1withRSAEncryption (1 2 840 113549 1 1 5)
             :         (PKCS #1)
 44 05    0:       NULL
             :       }
 46 30   18:     SEQUENCE {
 48 31   16:       SET {
 50 30   14:         SEQUENCE {
 52 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
             :             (X.520 id-at (2 5 4))
 57 13    7:           PrintableString 'CarlRSA'
             :           }
             :         }
             :       }
 66 30   30:     SEQUENCE {
 68 17   13:       UTCTime '990919010902Z'
 83 17   13:       UTCTime '3912312359592'
             :       }
 98 30   17:     SEQUENCE {
100 31   15:       SET {
102 30   13:         SEQUENCE {
104 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
             :             (X.520 id-at (2 5 4))
109 13    6:           PrintableString 'BobRSA'
             :           }
             :         }
             :       }
117 30  159:     SEQUENCE {
120 30   13:       SEQUENCE {
122 06    9:         OBJECT IDENTIFIER
             :           rsaEncryption (1 2 840 113549 1 1 1)
             :           (PKCS #1)
133 05    0:         NULL
             :         }
135 03  141:       BIT STRING 0 unused bits, encapsulates {
139 30  137:         SEQUENCE {
142 02  129:           INTEGER
             :             00 A9 E1 67 98 3F 39 D5 5F F2 A0 93
             :             41 5E A6 79 89 85 C8 35 5D 9A 91 5B
             :             FB 1D 01 DA 19 70 26 17 0F BD A5 22
             :             D0 35 85 6D 7A 98 66 14 41 5C CF B7
             :             B7 08 3B 09 C9 91 B8 19 69 37 6D F9
             :             65 1E 7B D9 A9 33 24 A3 7F 3B BB AF
             :             46 01 86 36 34 32 CB 07 03 59 52 FC
             :             85 8B 31 04 B8 CC 18 08 14 48 E6 4F
             :             1C FB 5D 60 C4 E0 5C 1F 53 D3 7F 53
             :             D8 69 01 F1 05 F8 7A 70 D1 BE 83 C6
```

```
                :                 5F 38 CF 1C 2C AA 6A A7 EB
    274 02    3:               INTEGER 65537
                :               }
                :             }
                :           }
    279 A3  127:       [3] {
    281 30  125:         SEQUENCE {
    283 30   12:           SEQUENCE {
    285 06    3:             OBJECT IDENTIFIER
                :               basicConstraints (2 5 29 19)
                :               (X.509 id-ce (2 5 29))
    290 01    1:             BOOLEAN TRUE
    293 04    2:             OCTET STRING, encapsulates {
    295 30    0:                 SEQUENCE {}
                :                 }
                :             }
    297 30   14:           SEQUENCE {
    299 06    3:             OBJECT IDENTIFIER keyUsage (2 5 29 15)
                :               (X.509 id-ce (2 5 29))
    304 01    1:             BOOLEAN TRUE
    307 04    4:             OCTET STRING, encapsulates {
    309 03    2:                 BIT STRING 5 unused bits
                :                   '100'B (bit 2)
                :                 }
                :             }
    313 30   31:           SEQUENCE {
    315 06    3:             OBJECT IDENTIFIER
                :               authorityKeyIdentifier (2 5 29 35)
                :               (X.509 id-ce (2 5 29))
    320 04   24:             OCTET STRING, encapsulates {
    322 30   22:                 SEQUENCE {
    324 80   20:                   [0]
                :                     E9 E0 90 27 AC 78 20 7A 9A D3 4C F2
                :                     42 37 4E 22 AE 9E 38 BB
                :                   }
                :                 }
                :             }
    346 30   29:           SEQUENCE {
    348 06    3:             OBJECT IDENTIFIER
                :               subjectKeyIdentifier (2 5 29 14)
                :               (X.509 id-ce (2 5 29))
    353 04   22:             OCTET STRING, encapsulates {
    355 04   20:                 OCTET STRING
                :                   E8 F4 B8 67 D8 B3 96 A4 2A F3 11 AA
                :                   29 D3 95 5A 86 16 B4 24
                :                 }
                :             }
    377 30   29:           SEQUENCE {
```

```
    379 06    3:           OBJECT IDENTIFIER subjectAltName (2 5 29 17)
                :             (X.509 id-ce (2 5 29))
    384 04   22:           OCTET STRING, encapsulates {
    386 30   20:               SEQUENCE {
    388 81   18:                 [1] 'BobRSA@example.com'
                :                 }
                :               }
                :           }
                :         }
                :       }
                :     }
    408 30   13:   SEQUENCE {
    410 06    9:     OBJECT IDENTIFIER
                :       sha1withRSAEncryption (1 2 840 113549 1 1 5)
                :       (PKCS #1)
    421 05    0:     NULL
                :     }
    423 03  129:   BIT STRING 0 unused bits
                :     7B 8E 66 C5 F1 10 3F 10 20 4C 88 71
                :     AB 7B 40 6B 21 33 FA 4A 95 DE 9D 0E
                :     5B 6B 94 21 05 C0 F2 E1 7E 2A CD 9C
                :     93 88 87 FB 8B B7 7E 7D 41 61 E1 E4
                :     D6 6D F9 E2 04 55 61 45 BC 64 27 44
                :     C0 A1 BD 59 79 D9 1D 64 3C 21 D6 45
                :     B0 5D 68 33 92 EA AC F1 57 E5 81 7D
                :     98 E6 35 91 A3 39 DE 77 F4 E8 1C 3B
                :     29 DC 7F 51 07 97 F3 36 F0 50 0A DD
                :     9B DE B6 5E 38 11 2B FB 57 EA 89 6D
                :     AD C9 88 D8 8F CF 2B D3
                :   }

   CarlDSSSelf =
      0 30  667: SEQUENCE {
      4 30  602:   SEQUENCE {
      8 A0    3:     [0] {
     10 02    1:       INTEGER 2
                :       }
     13 02    1:     INTEGER 1
     16 30    9:     SEQUENCE {
     18 06    7:       OBJECT IDENTIFIER dsaWithSha1 (1 2 840 10040 4 3)
                :         (ANSI X9.57 algorithm)
                :       }
     27 30   18:     SEQUENCE {
     29 31   16:       SET {
     31 30   14:         SEQUENCE {
     33 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
                :             (X.520 id-at (2 5 4))
     38 13    7:           PrintableString 'CarlDSS'
```

```
                :           }
                :         }
                :       }
     47 30   30:     SEQUENCE {
     49 17   13:       UTCTime '990816225050Z'
     64 17   13:       UTCTime '3912312359592'
                :       }
     79 30   18:     SEQUENCE {
     81 31   16:       SET {
     83 30   14:         SEQUENCE {
     85 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
                :             (X.520 id-at (2 5 4))
     90 13    7:           PrintableString 'CarlDSS'
                :           }
                :         }
                :       }
     99 30  439:     SEQUENCE {
    103 30  299:       SEQUENCE {
    107 06    7:         OBJECT IDENTIFIER dsa (1 2 840 10040 4 1)
                :           (ANSI X9.57 algorithm)
    116 30  286:         SEQUENCE {
    120 02  129:           INTEGER
                :             00 B6 49 18 3E 8A 44 C1 29 71 94 4C
                :             01 C4 12 C1 7A 79 CB 54 4D AB 1E 81
                :             FB C6 4C B3 0E 94 09 06 EB 01 D4 B1
                :             C8 71 4B C7 45 C0 50 25 5D 9C FC DA
                :             E4 6D D3 E2 86 48 84 82 7D BA 15 95
                :             4A 16 F6 46 ED DD F6 98 D2 BB 7E 8A
                :             0A 8A BA 16 7B B9 50 01 48 93 8B EB
                :             25 15 51 97 55 DC 8F 53 0E 10 A9 50
                :             FC 70 B7 CD 30 54 FD DA DE A8 AA 22
                :             B5 A1 AF 8B CC 02 88 E7 8B 70 5F B9
                :             AD E1 08 D4 6D 29 2D D6 E9
    252 02   21:           INTEGER
                :             00 DD C1 2F DF 53 CE 0B 34 60 77 3E
                :             02 A4 BF 8A 5D 98 B9 10 D5
    275 02  128:           INTEGER
                :             0C EE 57 9B 4B BD DA B6 07 6A 74 37
                :             4F 55 7F 9D ED BC 61 0D EB 46 59 3C
                :             56 0B 2B 5B 0C 91 CE A5 62 52 69 CA
                :             E1 6D 3E BD BF FE E1 B7 B9 2B 61 3C
                :             AD CB AE 45 E3 06 AC 8C 22 9D 9C 44
                :             87 0B C7 CD F0 1C D9 B5 4E 5D 73 DE
                :             AF 0E C9 1D 5A 51 F5 4F 44 79 35 5A
                :             73 AA 7F 46 51 1F A9 42 16 9C 48 EB
                :             8A 79 61 B4 D5 2F 53 22 44 63 1F 86
                :             B8 A3 58 06 25 F8 29 C0 EF BA E0 75
                :             F0 42 C4 63 65 52 9B 0A
```

```
                :           }
                :         }
    406 03  133:       BIT STRING 0 unused bits, encapsulates {
    410 02  129:           INTEGER
                :             00 99 87 74 27 03 66 A0 B1 C0 AD DC
                :             2C 75 BB E1 6C 44 9C DA 21 6D 4D 47
                :             6D B1 62 09 E9 D8 AE 1E F2 3A B4 94
                :             B1 A3 8E 7A 9B 71 4E 00 94 C9 B4 25
                :             4E B9 60 96 19 24 01 F3 62 0C FE 75
                :             C0 FB CE D8 68 00 E3 FD D5 70 4F DF
                :             23 96 19 06 94 F4 B1 61 8F 3A 57 B1
                :             08 11 A4 0B 26 25 F0 52 76 81 EA 0B
                :             62 0D 95 2A E6 86 BA 72 B2 A7 50 83
                :             0B AA 27 CD 1B A9 4D 89 9A D7 8D 18
                :             39 84 3F 8B C5 56 4D 80 7A
                :           }
                :       }
    542 A3   66:     [3] {
    544 30   64:       SEQUENCE {
    546 30   15:         SEQUENCE {
    548 06    3:           OBJECT IDENTIFIER
                :             basicConstraints (2 5 29 19)
                :             (X.509 id-ce (2 5 29))
    553 01    1:           BOOLEAN TRUE
    556 04    5:           OCTET STRING, encapsulates {
    558 30    3:               SEQUENCE {
    560 01    1:                 BOOLEAN TRUE
                :                 }
                :               }
                :           }
    563 30   14:         SEQUENCE {
    565 06    3:           OBJECT IDENTIFIER keyUsage (2 5 29 15)
                :             (X.509 id-ce (2 5 29))
    570 01    1:           BOOLEAN TRUE
    573 04    4:           OCTET STRING, encapsulates {
    575 03    2:               BIT STRING 1 unused bits
                :                 '1100001'B
                :               }
                :           }
    579 30   29:         SEQUENCE {
    581 06    3:           OBJECT IDENTIFIER
                :             subjectKeyIdentifier (2 5 29 14)
                :             (X.509 id-ce (2 5 29))
    586 04   22:           OCTET STRING, encapsulates {
    588 04   20:               OCTET STRING
                :                 70 44 3E 82 2E 6F 87 DE 4A D3 75 E3
                :                 3D 20 BC 43 2B 93 F1 1F
                :               }
```

```
                :           }
                :         }
                :       }
                :     }
    610 30    9:   SEQUENCE {
    612 06    7:     OBJECT IDENTIFIER dsaWithSha1 (1 2 840 10040 4 3)
                :       (ANSI X9.57 algorithm)
                :     }
    621 03   48:   BIT STRING 0 unused bits, encapsulates {
    624 30   45:       SEQUENCE {
    626 02   20:         INTEGER
                :           6B A9 F0 4E 7A 5A 79 E3 F9 BE 3D 2B
                :           C9 06 37 E9 11 17 A1 13
    648 02   21:         INTEGER
                :           00 8F 34 69 2A 8B B1 3C 03 79 94 32
                :           4D 12 1F CE 89 FB 46 B2 3B
                :         }
                :       }
                :   }

   CarlRSASelf =
      0 30  491: SEQUENCE {
      4 30  340:   SEQUENCE {
      8 A0    3:     [0] {
     10 02    1:       INTEGER 2
                :       }
     13 02   16:     INTEGER
                :       46 34 6B C7 80 00 56 BC 11 D3 6E 2E
                :       9F F2 50 20
     31 30   13:     SEQUENCE {
     33 06    9:       OBJECT IDENTIFIER
                :         sha1withRSAEncryption (1 2 840 113549 1 1 5)
                :         (PKCS #1)
     44 05    0:       NULL
                :       }
     46 30   18:     SEQUENCE {
     48 31   16:       SET {
     50 30   14:         SEQUENCE {
     52 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
                :             (X.520 id-at (2 5 4))
     57 13    7:           PrintableString 'CarlRSA'
                :           }
                :         }
                :       }
     66 30   30:     SEQUENCE {
     68 17   13:       UTCTime '990818070000Z'
     83 17   13:       UTCTime '391231235959Z'
                :       }
```

```
 98 30   18:     SEQUENCE {
100 31   16:       SET {
102 30   14:         SEQUENCE {
104 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
                :             (X.520 id-at (2 5 4))
109 13    7:           PrintableString 'CarlRSA'
                :           }
                :         }
                :       }
118 30  159:     SEQUENCE {
121 30   13:       SEQUENCE {
123 06    9:         OBJECT IDENTIFIER
                :           rsaEncryption (1 2 840 113549 1 1 1)
                :           (PKCS #1)
134 05    0:         NULL
                :         }
136 03  141:       BIT STRING 0 unused bits, encapsulates {
140 30  137:           SEQUENCE {
143 02  129:             INTEGER
                :               00 E4 4B FF 18 B8 24 57 F4 77 FF 6E
                :               73 7B 93 71 5C BC 33 1A 92 92 72 23
                :               D8 41 46 D0 CD 11 3A 04 B3 8E AF 82
                :               9D BD 51 1E 17 7A F2 76 2C 2B 86 39
                :               A7 BD D7 8D 1A 53 EC E4 00 D5 E8 EC
                :               A2 36 B1 ED E2 50 E2 32 09 8A 3F 9F
                :               99 25 8F B8 4E AB B9 7D D5 96 65 DA
                :               16 A0 C5 BE 0E AE 44 5B EF 5E F4 A7
                :               29 CB 82 DD AC 44 E9 AA 93 94 29 0E
                :               F8 18 D6 C8 57 5E F2 76 C4 F2 11 60
                :               38 B9 1B 3C 1D 97 C9 6A F1
275 02    3:             INTEGER 65537
                :             }
                :           }
                :       }
280 A3   66:     [3] {
282 30   64:       SEQUENCE {
284 30   15:         SEQUENCE {
286 06    3:           OBJECT IDENTIFIER
                :             basicConstraints (2 5 29 19)
                :             (X.509 id-ce (2 5 29))
291 01    1:           BOOLEAN TRUE
294 04    5:           OCTET STRING, encapsulates {
296 30    3:               SEQUENCE {
298 01    1:                 BOOLEAN TRUE
                :                 }
                :               }
                :           }
301 30   14:         SEQUENCE {
```

```
    303 06    3:           OBJECT IDENTIFIER keyUsage (2 5 29 15)
                :             (X.509 id-ce (2 5 29))
    308 01    1:           BOOLEAN TRUE
    311 04    4:           OCTET STRING, encapsulates {
    313 03    2:               BIT STRING 1 unused bits
                :                 '1100001'B
                :               }
                :           }
    317 30   29:         SEQUENCE {
    319 06    3:           OBJECT IDENTIFIER
                :             subjectKeyIdentifier (2 5 29 14)
                :             (X.509 id-ce (2 5 29))
    324 04   22:           OCTET STRING, encapsulates {
    326 04   20:               OCTET STRING
                :                 E9 E0 90 27 AC 78 20 7A 9A D3 4C F2
                :                 42 37 4E 22 AE 9E 38 BB
                :               }
                :           }
                :         }
                :       }
                :     }
    348 30   13:   SEQUENCE {
    350 06    9:     OBJECT IDENTIFIER
                :       sha1withRSAEncryption (1 2 840 113549 1 1 5)
                :       (PKCS #1)
    361 05    0:     NULL
                :     }
    363 03  129:   BIT STRING 0 unused bits
                :     B7 9E D4 04 D3 ED 29 E4 FF 89 89 15
                :     2E 4C DB 0C F0 48 0F 32 61 EE C4 04
                :     EC 12 5D 2D FF 0F 64 59 7E 0A C3 ED
                :     18 FD E3 56 40 37 A7 07 B5 F0 38 12
                :     61 50 ED EF DD 3F E3 0B B8 61 A5 A4
                :     9B 3C E6 9E 9C 54 9A B6 95 D6 DA 6C
                :     3B B5 2D 45 35 9D 49 01 76 FA B9 B9
                :     31 F9 F9 6B 12 53 A0 F5 14 60 9B 7D
                :     CA 3E F2 53 6B B0 37 6F AD E6 74 D7
                :     DB FA 5A EA 14 41 63 5D CD BE C8 0E
                :     C1 DA 6A 8D 53 34 18 02
                :   }

   DianeDSSSignByCarlInherit =
      0 30  440: SEQUENCE {
      4 30  375:   SEQUENCE {
      8 A0    3:     [0] {
     10 02    1:       INTEGER 2
                :       }
     13 02    2:     INTEGER 210
```

```
     17 30    9:     SEQUENCE {
     19 06    7:       OBJECT IDENTIFIER dsaWithSha1 (1 2 840 10040 4 3)
               :         (ANSI X9.57 algorithm)
               :       }
     28 30   18:     SEQUENCE {
     30 31   16:       SET {
     32 30   14:         SEQUENCE {
     34 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
               :             (X.520 id-at (2 5 4))
     39 13    7:           PrintableString 'CarlDSS'
               :           }
               :         }
               :       }
     48 30   30:     SEQUENCE {
     50 17   13:       UTCTime '990817020810Z'
     65 17   13:       UTCTime '3912312359592'
               :       }
     80 30   19:     SEQUENCE {
     82 31   17:       SET {
     84 30   15:         SEQUENCE {
     86 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
               :             (X.520 id-at (2 5 4))
     91 13    8:           PrintableString 'DianeDSS'
               :           }
               :         }
               :       }
    101 30  147:     SEQUENCE {
    104 30    9:       SEQUENCE {
    106 06    7:         OBJECT IDENTIFIER dsa (1 2 840 10040 4 1)
               :           (ANSI X9.57 algorithm)
               :         }
    115 03  133:       BIT STRING 0 unused bits, encapsulates {
    119 02  129:           INTEGER
               :             00 A0 00 17 78 2C EE 7E 81 53 2E 2E
               :             61 08 0F A1 9B 51 52 1A DA 59 A8 73
               :             2F 12 25 B6 08 CB CA EF 2A 44 76 8A
               :             52 09 EA BD 05 22 D5 0F F6 FD 46 D7
               :             AF 99 38 09 0E 13 CB 4F 2C DD 1C 34
               :             F7 1C BF 25 FF 23 D3 3B 59 E7 82 97
               :             37 BE 31 24 D8 18 C8 F3 49 39 5B B7
               :             E2 E5 27 7E FC 8C 45 72 5B 7E 3E 8F
               :             68 4D DD 46 7A 22 BE 8E FF CC DA 39
               :             29 A3 39 E5 9F 43 E9 55 C9 D7 5B A6
               :             81 67 CC C0 AA CD 2E C5 23
               :           }
               :       }
    251 A3  129:     [3] {
    254 30  127:       SEQUENCE {
```

```
    256 30   12:         SEQUENCE {
    258 06    3:           OBJECT IDENTIFIER
                :             basicConstraints (2 5 29 19)
                :             (X.509 id-ce (2 5 29))
    263 01    1:           BOOLEAN TRUE
    266 04    2:           OCTET STRING, encapsulates {
    268 30    0:               SEQUENCE {}
                :               }
                :           }
    270 30   14:         SEQUENCE {
    272 06    3:           OBJECT IDENTIFIER keyUsage (2 5 29 15)
                :             (X.509 id-ce (2 5 29))
    277 01    1:           BOOLEAN TRUE
    280 04    4:           OCTET STRING, encapsulates {
    282 03    2:               BIT STRING 6 unused bits
                :                 '11'B
                :               }
                :           }
    286 30   31:         SEQUENCE {
    288 06    3:           OBJECT IDENTIFIER
                :             authorityKeyIdentifier (2 5 29 35)
                :             (X.509 id-ce (2 5 29))
    293 04   24:           OCTET STRING, encapsulates {
    295 30   22:               SEQUENCE {
    297 80   20:                 [0]
                :                   70 44 3E 82 2E 6F 87 DE 4A D3 75 E3
                :                   3D 20 BC 43 2B 93 F1 1F
                :                 }
                :               }
                :           }
    319 30   29:         SEQUENCE {
    321 06    3:           OBJECT IDENTIFIER
                :             subjectKeyIdentifier (2 5 29 14)
                :             (X.509 id-ce (2 5 29))
    326 04   22:           OCTET STRING, encapsulates {
    328 04   20:               OCTET STRING
                :                 64 30 99 7D 5C DC 45 0B 99 3A 52 2F
                :                 16 BF 58 50 DD CE 2B 18
                :               }
                :           }
    350 30   31:         SEQUENCE {
    352 06    3:           OBJECT IDENTIFIER subjectAltName (2 5 29 17)
                :             (X.509 id-ce (2 5 29))
    357 04   24:           OCTET STRING, encapsulates {
    359 30   22:               SEQUENCE {
    361 81   20:                 [1] 'DianeDSS@example.com'
                :                 }
                :               }
```

```
                :           }
                :         }
                :       }
                :     }
    383 30    9:   SEQUENCE {
    385 06    7:     OBJECT IDENTIFIER dsaWithSha1 (1 2 840 10040 4 3)
                :       (ANSI X9.57 algorithm)
                :     }
    394 03   48:   BIT STRING 0 unused bits, encapsulates {
    397 30   45:       SEQUENCE {
    399 02   21:         INTEGER
                :           00 A1 1A F8 17 0E 3E 5D A8 8C F4 B6
                :           55 33 1E 4B E3 2C AC B9 5F
    422 02   20:         INTEGER
                :           28 4B 10 45 58 D2 1C 9D 55 35 14 18
                :           91 B2 3F 39 DF B5 6E D3
                :         }
                :       }
                :   }

   DianeRSASignByCarl =
      0 30  556: SEQUENCE {
      4 30  405:   SEQUENCE {
      8 A0    3:     [0] {
     10 02    1:       INTEGER 2
                :       }
     13 02   16:     INTEGER
                :       46 34 6B C7 80 00 56 BC 11 D3 6E 2E
                :       D5 9A 30 90
     31 30   13:     SEQUENCE {
     33 06    9:       OBJECT IDENTIFIER
                :         sha1withRSAEncryption (1 2 840 113549 1 1 5)
                :         (PKCS #1)
     44 05    0:       NULL
                :       }
     46 30   18:     SEQUENCE {
     48 31   16:       SET {
     50 30   14:         SEQUENCE {
     52 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
                :             (X.520 id-at (2 5 4))
     57 13    7:           PrintableString 'CarlRSA'
                :           }
                :         }
                :       }
     66 30   30:     SEQUENCE {
     68 17   13:       UTCTime '990819070000Z'
     83 17   13:       UTCTime '3912312359592'
                :       }
```

```
 98 30   19:     SEQUENCE {
100 31   17:       SET {
102 30   15:         SEQUENCE {
104 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
                :             (X.520 id-at (2 5 4))
109 13    8:           PrintableString 'DianeRSA'
                :           }
                :         }
                :       }
119 30  159:     SEQUENCE {
122 30   13:       SEQUENCE {
124 06    9:         OBJECT IDENTIFIER
                :           rsaEncryption (1 2 840 113549 1 1 1)
                :           (PKCS #1)
135 05    0:         NULL
                :         }
137 03  141:       BIT STRING 0 unused bits, encapsulates {
141 30  137:         SEQUENCE {
144 02  129:           INTEGER
                :             00 D6 FD B8 C0 70 C6 4C 25 EC EA CF
                :             EA 7C BB A2 62 FA F0 E6 32 3A 53 FF
                :             B1 92 5A 17 F4 20 E1 99 24 82 0A D0
                :             F6 7C FB 44 CA 8B 27 06 F1 7E 26 03
                :             A9 76 9D CF EC A0 2C 70 96 F2 83 42
                :             F6 D4 B7 28 0A BB F8 BF 4A 4C 19 3F
                :             07 DB A0 C1 60 1E B7 7E 67 F7 DE B1
                :             C3 60 49 AC 45 D7 F8 C6 EF 08 37 21
                :             93 47 EE F0 73 35 72 B0 02 C4 F3 11
                :             C3 5E 47 E5 0A B7 83 F1 DB 74 69 64
                :             8B 44 1D 95 5D CD 28 C0 85
276 02    3:           INTEGER 65537
                :           }
                :         }
                :       }
281 A3  129:     [3] {
284 30  127:       SEQUENCE {
286 30   12:         SEQUENCE {
288 06    3:           OBJECT IDENTIFIER
                :             basicConstraints (2 5 29 19)
                :             (X.509 id-ce (2 5 29))
293 01    1:           BOOLEAN TRUE
296 04    2:           OCTET STRING, encapsulates {
298 30    0:             SEQUENCE {}
                :             }
                :           }
300 30   14:         SEQUENCE {
302 06    3:           OBJECT IDENTIFIER keyUsage (2 5 29 15)
                :             (X.509 id-ce (2 5 29))
```

```
    307 01    1:           BOOLEAN TRUE
    310 04    4:           OCTET STRING, encapsulates {
    312 03    2:               BIT STRING 5 unused bits
                :                 '111'B
                :               }
                :           }
    316 30   31:         SEQUENCE {
    318 06    3:           OBJECT IDENTIFIER
                :             authorityKeyIdentifier (2 5 29 35)
                :             (X.509 id-ce (2 5 29))
    323 04   24:           OCTET STRING, encapsulates {
    325 30   22:               SEQUENCE {
    327 80   20:                 [0]
                :                   E9 E0 90 27 AC 78 20 7A 9A D3 4C F2
                :                   42 37 4E 22 AE 9E 38 BB
                :                 }
                :               }
                :           }
    349 30   29:         SEQUENCE {
    351 06    3:           OBJECT IDENTIFIER
                :             subjectKeyIdentifier (2 5 29 14)
                :             (X.509 id-ce (2 5 29))
    356 04   22:           OCTET STRING, encapsulates {
    358 04   20:               OCTET STRING
                :                 8C F3 CB 75 0E 8D 31 F6 D4 29 DA 44
                :                 92 75 B8 FE ED 4F 39 0C
                :               }
                :           }
    380 30   31:         SEQUENCE {
    382 06    3:           OBJECT IDENTIFIER subjectAltName (2 5 29 17)
                :             (X.509 id-ce (2 5 29))
    387 04   24:           OCTET STRING, encapsulates {
    389 30   22:               SEQUENCE {
    391 81   20:                 [1] 'DianeRSA@example.com'
                :                 }
                :               }
                :           }
                :         }
                :       }
    413 30   13:     SEQUENCE {
    415 06    9:       OBJECT IDENTIFIER
                :         sha1withRSAEncryption (1 2 840 113549 1 1 5)
                :         (PKCS #1)
    426 05    0:       NULL
                :       }
    428 03  129:     BIT STRING 0 unused bits
                :       7D A6 2C B5 78 42 D6 79 F3 31 FE F6
```

```
              :     42 CA 0F 13 07 92 09 1B E0 6F B0 91
              :     18 F6 BF 4A FB CC 63 79 FB 81 BF DD
              :     97 C7 90 6B CB 0A 37 2B 41 6A 03 98
              :     C5 1B 3E 32 C8 45 2B 86 01 9C 1C E2
              :     36 EF 16 C1 1A 92 B8 BE 62 FB 53 3E
              :     49 47 0B C4 B9 E4 2B 58 A6 06 83 F0
              :     B2 A7 BB 85 7E D5 C6 DA CE 9C 7B 31
              :     72 D7 A2 EA 41 AB 6A C0 DD 1F B9 14
              :     44 18 CF 84 57 66 E8 C5 E6 B8 DC 2D
              :     B3 1F 1B 28 43 36 75 7A
              :   }
```

2.4. CRLs

```
   CarlDSSCRLForAll =
      0 30  216: SEQUENCE {
      3 30  153:   SEQUENCE {
      6 30    9:     SEQUENCE {
      8 06    7:       OBJECT IDENTIFIER dsaWithSha1 (1 2 840 10040 4 3)
               :         (ANSI X9.57 algorithm)
               :       }
     17 30   18:     SEQUENCE {
     19 31   16:       SET {
     21 30   14:         SEQUENCE {
     23 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
               :             (X.520 id-at (2 5 4))
     28 13    7:           PrintableString 'CarlDSS'
               :           }
               :         }
               :       }
     37 17   13:     UTCTime '990827070000Z'
     52 30  105:     SEQUENCE {
     54 30   19:       SEQUENCE {
     56 02    2:         INTEGER 200
     60 17   13:         UTCTime '990822070000Z'
               :         }
     75 30   19:       SEQUENCE {
     77 02    2:         INTEGER 201
     81 17   13:         UTCTime '990822070000Z'
               :         }
     96 30   19:       SEQUENCE {
     98 02    2:         INTEGER 211
    102 17   13:         UTCTime '990822070000Z'
               :         }
    117 30   19:       SEQUENCE {
    119 02    2:         INTEGER 210
    123 17   13:         UTCTime '990822070000Z'
               :         }
```

```
    138 30   19:       SEQUENCE {
    140 02    2:         INTEGER 212
    144 17   13:         UTCTime '990824070000Z'
                :         }
                :       }
                :     }
    159 30    9:   SEQUENCE {
    161 06    7:     OBJECT IDENTIFIER dsaWithSha1 (1 2 840 10040 4 3)
                :       (ANSI X9.57 algorithm)
                :     }
    170 03   47:   BIT STRING 0 unused bits, encapsulates {
    173 30   44:       SEQUENCE {
    175 02   20:         INTEGER
                :           7E 65 52 76 33 FE 34 73 17 D1 F7 96
                :           F9 A0 D4 D8 6D 5C 7D 3D
    197 02   20:         INTEGER
                :           02 7A 5B B7 D5 5B 18 C1 CF 87 EF 7E
                :           DA 24 F3 2A 83 9C 35 A1
                :         }
                :       }
                :   }

   CarlDSSCRLForCarl =
      0 30  131: SEQUENCE {
      3 30   68:   SEQUENCE {
      5 30    9:     SEQUENCE {
      7 06    7:       OBJECT IDENTIFIER dsaWithSha1 (1 2 840 10040 4 3)
                :         (ANSI X9.57 algorithm)
                :       }
     16 30   18:     SEQUENCE {
     18 31   16:       SET {
     20 30   14:         SEQUENCE {
     22 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
                :             (X.520 id-at (2 5 4))
     27 13    7:           PrintableString 'CarlDSS'
                :           }
                :         }
                :       }
     36 17   13:     UTCTime '990825070000Z'
     51 30   20:     SEQUENCE {
     53 30   18:       SEQUENCE {
     55 02    1:         INTEGER 1
     58 17   13:         UTCTime '990822070000Z'
                :         }
                :       }
                :     }
     73 30    9:   SEQUENCE {
     75 06    7:     OBJECT IDENTIFIER dsaWithSha1 (1 2 840 10040 4 3)
```

```
                :       (ANSI X9.57 algorithm)
                :     }
     84 03   48:   BIT STRING 0 unused bits, encapsulates {
     87 30   45:       SEQUENCE {
     89 02   21:         INTEGER
                :           00 B3 1F C5 4F 7A 3D EC 76 D5 60 F9
                :           DE 79 22 EC 4F B0 90 FE 97
    112 02   20:         INTEGER
                :           5A 8B C3 84 BC 66 87 1B BF 79 82 5B
                :           0A 5D 07 F6 BA A9 05 29
                :         }
                :       }
                :   }

   CarlDSSCRLEmpty =
      0 30  109: SEQUENCE {
      2 30   46:   SEQUENCE {
      4 30    9:     SEQUENCE {
      6 06    7:       OBJECT IDENTIFIER dsaWithSha1 (1 2 840 10040 4 3)
                :         (ANSI X9.57 algorithm)
                :       }
     15 30   18:     SEQUENCE {
     17 31   16:       SET {
     19 30   14:         SEQUENCE {
     21 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
                :             (X.520 id-at (2 5 4))
     26 13    7:           PrintableString 'CarlDSS'
                :           }
                :         }
                :       }
     35 17   13:     UTCTime '990820070000Z'
                :     }
     50 30    9:   SEQUENCE {
     52 06    7:     OBJECT IDENTIFIER dsaWithSha1 (1 2 840 10040 4 3)
                :       (ANSI X9.57 algorithm)
                :     }
     61 03   48:   BIT STRING 0 unused bits, encapsulates {
     64 30   45:       SEQUENCE {
     66 02   20:         INTEGER
                :           62 3F 36 17 31 58 2E 67 50 79 F5 09
                :           4B 8C AD D4 6B F4 64 9F
     88 02   21:         INTEGER
                :           00 B5 3B 4E A1 4C 7B FD 0F C3 8D 9B
                :           B6 FE C3 5D 6F DE 65 28 7D
                :         }
                :       }
                :   }
```

```
   CarlRSACRLForAll =
      0 30  307: SEQUENCE {
      4 30  157:   SEQUENCE {
      7 30   13:     SEQUENCE {
      9 06    9:       OBJECT IDENTIFIER
               :         md5withRSAEncryption (1 2 840 113549 1 1 4)
               :         (PKCS #1)
     20 05    0:       NULL
               :       }
     22 30   18:     SEQUENCE {
     24 31   16:       SET {
     26 30   14:         SEQUENCE {
     28 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
               :             (X.520 id-at (2 5 4))
     33 13    7:           PrintableString 'CarlRSA'
               :           }
               :         }
               :       }
     42 17   13:     UTCTime '990827070000Z'
     57 30  105:     SEQUENCE {
     59 30   33:       SEQUENCE {
     61 02   16:         INTEGER
               :           46 34 6B C7 80 00 56 BC 11 D3 6E 2E
               :           C4 10 B3 B0
     79 17   13:         UTCTime '990822070000Z'
               :         }
     94 30   33:       SEQUENCE {
     96 02   16:         INTEGER
               :           46 34 6B C7 80 00 56 BC 11 D3 6E 2E
               :           D5 9A 30 90
    114 17   13:         UTCTime '990822070000Z'
               :         }
    129 30   33:       SEQUENCE {
    131 02   16:         INTEGER
               :           46 34 6B C7 80 00 56 BC 11 D3 6E 2E
               :           CD 5D 71 D0
    149 17   13:         UTCTime '990824070000Z'
               :         }
               :       }
               :     }
    164 30   13:   SEQUENCE {
    166 06    9:     OBJECT IDENTIFIER
               :       md5withRSAEncryption (1 2 840 113549 1 1 4)
               :       (PKCS #1)
    177 05    0:     NULL
               :     }
    179 03  129:   BIT STRING 0 unused bits
               :     BF B3 97 AA 53 F0 32 21 16 2B 77 92
```

```
              :     7A 6B BB 97 C8 DC EA F1 FA 66 16 30
              :     0E B5 9E 5C F0 81 D4 5E B3 6E C1 88
              :     6B 8C D4 5E C5 4D FB 47 5E 66 F3 5D
              :     AB E5 B4 18 36 60 A8 4D 9C 3C 89 EC
              :     6F 27 BF 35 50 71 81 C2 B9 44 5B 62
              :     89 19 12 31 A9 7B 9A D3 CC 66 CB 11
              :     D9 0B 10 47 77 AD 4F 22 D9 E5 7F 30
              :     F2 5B FC 94 51 A5 58 76 3B 1F A8 46
              :     A6 1F F6 A1 DE 55 A1 ED 31 88 69 97
              :     0F 08 D3 D4 0C 60 5B 1E
              :   }

   CarlRSACRLForCarl =
      0 30  236: SEQUENCE {
      3 30   87:   SEQUENCE {
      5 30   13:     SEQUENCE {
      7 06    9:       OBJECT IDENTIFIER
              :         md5withRSAEncryption (1 2 840 113549 1 1 4)
              :         (PKCS #1)
     18 05    0:       NULL
              :       }
     20 30   18:     SEQUENCE {
     22 31   16:       SET {
     24 30   14:         SEQUENCE {
     26 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
              :             (X.520 id-at (2 5 4))
     31 13    7:           PrintableString 'CarlRSA'
              :           }
              :         }
              :       }
     40 17   13:     UTCTime '990825070000Z'
     55 30   35:     SEQUENCE {
     57 30   33:       SEQUENCE {
     59 02   16:         INTEGER
              :           46 34 6B C7 80 00 56 BC 11 D3 6E 2E
              :           9F F2 50 20
     77 17   13:         UTCTime '990822070000Z'
              :         }
              :       }
              :     }
     92 30   13:   SEQUENCE {
     94 06    9:     OBJECT IDENTIFIER
              :       md5withRSAEncryption (1 2 840 113549 1 1 4)
              :       (PKCS #1)
    105 05    0:     NULL
              :     }
    107 03  129:   BIT STRING 0 unused bits
              :     21 EF 21 D4 C1 1A 85 95 49 6B CA 45
```

```
              :     62 DC D7 09 FF A9 51 2E 8E D9 47 18
              :     FA F8 E5 72 DD 4F ED 74 74 E3 F3 65
              :     32 65 28 2C 9A 1D 57 E5 D5 26 06 EA
              :     D5 E6 23 95 84 8D 0E 89 9E EE 9B 0C
              :     2F CE 07 F7 A3 D1 6B 85 4C 0F FF E6
              :     DD FC DC CD 73 2C 1E 7D DC B0 71 C5
              :     4C FC 01 6E 52 57 69 1E 39 63 DF 12
              :     22 30 C7 13 55 94 05 6E 2A 00 A9 5B
              :     C4 2A 66 94 62 CE 36 33 C2 2B 63 47
              :     25 9D F3 DE 70 EE 00 56
              :   }

   CarlRSACRLEmpty =
      0 30  199: SEQUENCE {
      3 30   50:   SEQUENCE {
      5 30   13:     SEQUENCE {
      7 06    9:       OBJECT IDENTIFIER
                :         md5withRSAEncryption (1 2 840 113549 1 1 4)
                :         (PKCS #1)
     18 05    0:       NULL
                :       }
     20 30   18:     SEQUENCE {
     22 31   16:       SET {
     24 30   14:         SEQUENCE {
     26 06    3:           OBJECT IDENTIFIER commonName (2 5 4 3)
                :             (X.520 id-at (2 5 4))
     31 13    7:           PrintableString 'CarlRSA'
                :           }
                :         }
                :       }
     40 17   13:     UTCTime '990820070000Z'
                :     }
     55 30   13:   SEQUENCE {
     57 06    9:     OBJECT IDENTIFIER
                :       md5withRSAEncryption (1 2 840 113549 1 1 4)
                :       (PKCS #1)
     68 05    0:     NULL
                :     }
     70 03  129:   BIT STRING 0 unused bits
                :     A9 C5 21 B8 13 7C 74 F3 B5 11 EC 04
                :     F3 20 45 86 1E 0B 6E 7F 83 6D 5F F4
                :     34 76 06 59 25 0E 04 3D 88 09 88 81
                :     37 C4 DC 20 98 FA 17 81 0B 37 94 AC
                :     B4 8F 7B 51 89 14 A4 CB 72 73 14 07
                :     BC 22 9C 40 A1 07 FC 44 7C 85 0F 0B
                :     88 D1 EE E1 0E AF F6 16 74 AD A1 AF
                :     C1 00 75 00 64 EA A5 9A F6 0B 08 A2
                :     DB 95 19 5F A6 A7 B9 39 45 25 0A 0E
```

```
              :     F6 5E 84 E7 F8 B9 5A C9 18 C2 0E B8
              :     A0 96 BE 81 3A 80 6D C9
              :   }
```

3. Trivial Examples

This section covers examples of small CMS types.

3.1. ContentInfo with Data Type, BER

The object is a ContentInfo containing a Data object in BER format that is ExContent.

```
   0 30 NDEF: SEQUENCE {
   2 06    9:   OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
              :     (PKCS #7)
  13 A0 NDEF:   [0] {
  15 24 NDEF:     OCTET STRING {
  17 04    4:       OCTET STRING 'This'
  23 04   24:       OCTET STRING ' is some sample content.'
              :       }
              :     }
              :   }
```

3.2. ContentInfo with Data Type, DER

The object is a ContentInfo containing a Data object in DER format that is ExContent.

```
   0 30   43: SEQUENCE {
   2 06    9:   OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
              :     (PKCS #7)
  13 A0   30:   [0] {
  15 04   28:     OCTET STRING 'This is some sample content.'
              :     }
              :   }
```

4. Signed-data

4.1. Basic Signed Content, DSS

A SignedData with no attribute certificates, signed by Alice using DSS, just her certificate (not Carl's root cert), no CRL. The message is ExContent, and is included in the eContent. There are no signed or unsigned attributes.

```
    0 30  919: SEQUENCE {
    4 06    9:   OBJECT IDENTIFIER signedData (1 2 840 113549 1 7 2)
              :     (PKCS #7)
   15 A0  904:   [0] {
   19 30  900:     SEQUENCE {
   23 02    1:       INTEGER 1
   26 31    9:       SET {
   28 30    7:         SEQUENCE {
   30 06    5:           OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
              :             (OIW)
              :           }
              :         }
   37 30   43:       SEQUENCE {
   39 06    9:         OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
              :           (PKCS #7)
   50 A0   30:         [0] {
   52 04   28:           OCTET STRING 'This is some sample content.'
              :           }
              :         }
   82 A0  736:       [0] {
   86 30  732:         SEQUENCE {
   90 30  667:           SEQUENCE {
   94 A0    3:             [0] {
   96 02    1:               INTEGER 2
              :               }
   99 02    2:             INTEGER 200
  103 30    9:             SEQUENCE {
  105 06    7:               OBJECT IDENTIFIER
              :                 dsaWithSha1 (1 2 840 10040 4 3)
              :                 (ANSI X9.57 algorithm)
              :               }
  114 30   18:             SEQUENCE {
  116 31   16:               SET {
  118 30   14:                 SEQUENCE {
  120 06    3:                   OBJECT IDENTIFIER
              :                     commonName (2 5 4 3)
              :                     (X.520 id-at (2 5 4))
  125 13    7:                   PrintableString 'CarlDSS'
              :                   }
              :                 }
              :               }
  134 30   30:             SEQUENCE {
  136 17   13:               UTCTime '990817011049Z'
  151 17   13:               UTCTime '991231235959Z'
              :               }
  166 30   19:             SEQUENCE {
  168 31   17:               SET {
  170 30   15:                 SEQUENCE {
```

```
    172 06    3:                  OBJECT IDENTIFIER
              :                    commonName (2 5 4 3)
              :                    (X.520 id-at (2 5 4))
    177 13    8:                  PrintableString 'AliceDSS'
              :                  }
              :                }
              :              }
    187 30  438:            SEQUENCE {
    191 30  299:              SEQUENCE {
    195 06    7:                OBJECT IDENTIFIER
              :                  dsa (1 2 840 10040 4 1)
              :                  (ANSI X9.57 algorithm)
    204 30  286:                SEQUENCE {
    208 02  129:                  INTEGER
              :                    00 81 8D CD ED 83 EA 0A 9E 39 3E C2
              :                    48 28 A3 E4 47 93 DD 0E D7 A8 0E EC
              :                    53 C5 AB 84 08 4F FF 94 E1 73 48 7E
              :                    0C D6 F3 44 48 D1 FE 9F AF A4 A1 89
              :                    2F E1 D9 30 C8 36 DE 3F 9B BF B7 4C
              :                    DC 5F 69 8A E4 75 D0 37 0C 91 08 95
              :                    9B DE A7 5E F9 FC F4 9F 2F DD 43 A8
              :                    8B 54 F1 3F B0 07 08 47 4D 5D 88 C3
              :                    C3 B5 B3 E3 55 08 75 D5 39 76 10 C4
              :                    78 BD FF 9D B0 84 97 37 F2 E4 51 1B
              :                    B5 E4 09 96 5C F3 7E 5B DB
    340 02   21:                  INTEGER
              :                    00 E2 47 A6 1A 45 66 B8 13 C6 DA 8F
              :                    B8 37 21 2B 62 8B F7 93 CD
    363 02  128:                  INTEGER
              :                    26 38 D0 14 89 32 AA 39 FB 3E 6D D9
              :                    4B 59 6A 4C 76 23 39 04 02 35 5C F2
              :                    CB 1A 30 C3 1E 50 5D DD 9B 59 E2 CD
              :                    AA 05 3D 58 C0 7B A2 36 B8 6E 07 AF
              :                    7D 8A 42 25 A7 F4 75 CF 4A 08 5E 4B
              :                    3E 90 F8 6D EA 9C C9 21 8A 3B 76 14
              :                    E9 CE 2E 5D A3 07 CD 23 85 B8 2F 30
              :                    01 7C 6D 49 89 11 89 36 44 BD F8 C8
              :                    95 4A 53 56 B5 E2 F9 73 EC 1A 61 36
              :                    1F 11 7F C2 BD ED D1 50 FF 98 74 C2
              :                    D1 81 4A 60 39 BA 36 39
              :                  }
              :                }
    494 03  132:                BIT STRING 0 unused bits, encapsulates {
    498 02  128:                    INTEGER
              :                    5C E3 B9 5A 75 14 96 0B A9 7A DD E3
              :                    3F A9 EC AC 5E DC BD B7 13 11 34 A6
              :                    16 89 28 11 23 D9 34 86 67 75 75 13
              :                    12 3D 43 5B 6F E5 51 BF FA 89 F2 A2
```

```
              :                   1B 3E 24 7D 3D 07 8D 5B 63 C8 BB 45
              :                   A5 A0 4A E3 85 D6 CE 06 80 3F E8 23
              :                   7E 1A F2 24 AB 53 1A B8 27 0D 1E EF
              :                   08 BF 66 14 80 5C 62 AC 65 FA 15 8B
              :                   F1 BB 34 D4 D2 96 37 F6 61 47 B2 C4
              :                   32 84 F0 7E 41 40 FD 46 A7 63 4E 33
              :                   F2 A5 E2 F4 F2 83 E5 B8
              :                   }
              :                 }
   629 A3  129:               [3] {
   632 30  127:                 SEQUENCE {
   634 30   12:                   SEQUENCE {
   636 06    3:                     OBJECT IDENTIFIER
              :                       basicConstraints (2 5 29 19)
              :                       (X.509 id-ce (2 5 29))
   641 01    1:                     BOOLEAN TRUE
   644 04    2:                     OCTET STRING, encapsulates {
   646 30    0:                       SEQUENCE {}
              :                       }
              :                     }
   648 30   14:                   SEQUENCE {
   650 06    3:                     OBJECT IDENTIFIER
              :                       keyUsage (2 5 29 15)
              :                       (X.509 id-ce (2 5 29))
   655 01    1:                     BOOLEAN TRUE
   658 04    4:                     OCTET STRING, encapsulates {
   660 03    2:                       BIT STRING 6 unused bits
              :                         '11'B
              :                       }
              :                     }
   664 30   31:                   SEQUENCE {
   666 06    3:                     OBJECT IDENTIFIER
              :                       authorityKeyIdentifier (2 5 29 35)
              :                       (X.509 id-ce (2 5 29))
   671 04   24:                     OCTET STRING, encapsulates {
   673 30   22:                       SEQUENCE {
   675 80   20:                         [0]
              :                       70 44 3E 82 2E 6F 87 DE 4A D3 75 E3
              :                       3D 20 BC 43 2B 93 F1 1F
              :                         }
              :                       }
              :                     }
   697 30   29:                   SEQUENCE {
   699 06    3:                     OBJECT IDENTIFIER
              :                       subjectKeyIdentifier (2 5 29 14)
              :                       (X.509 id-ce (2 5 29))
   704 04   22:                     OCTET STRING, encapsulates {
   706 04   20:                       OCTET STRING
```

```
              :                   BE 6C A1 B3 E3 C1 F7 ED 43 70 A4 CE
              :                   13 01 E2 FD E3 97 FE CD
              :                       }
              :                   }
    728 30   31:                 SEQUENCE {
    730 06    3:                   OBJECT IDENTIFIER
              :                     subjectAltName (2 5 29 17)
              :                     (X.509 id-ce (2 5 29))
    735 04   24:                   OCTET STRING, encapsulates {
    737 30   22:                     SEQUENCE {
    739 81   20:                       [1] 'AliceDSS@example.com'
              :                       }
              :                     }
              :                   }
              :                 }
              :               }
              :             }
    761 30    9:           SEQUENCE {
    763 06    7:             OBJECT IDENTIFIER
              :               dsaWithSha1 (1 2 840 10040 4 3)
              :               (ANSI X9.57 algorithm)
              :             }
    772 03   48:           BIT STRING 0 unused bits, encapsulates {
    775 30   45:             SEQUENCE {
    777 02   20:               INTEGER
              :                 55 0C A4 19 1F 42 2B 89 71 22 33 8D
              :                 83 6A B5 3D 67 6B BF 45
    799 02   21:               INTEGER
              :                 00 9F 61 53 52 54 0B 5C B2 DD DA E7
              :                 76 1D E2 10 52 5B 43 5E BD
              :               }
              :             }
              :           }
              :         }
    822 31   99:       SET {
    824 30   97:         SEQUENCE {
    826 02    1:           INTEGER 1
    829 30   24:           SEQUENCE {
    831 30   18:             SEQUENCE {
    833 31   16:               SET {
    835 30   14:                 SEQUENCE {
    837 06    3:                   OBJECT IDENTIFIER
              :                     commonName (2 5 4 3)
              :                     (X.520 id-at (2 5 4))
    842 13    7:                   PrintableString 'CarlDSS'
              :                   }
              :                 }
              :               }
```

```
    851 02    2:             INTEGER 200
                :             }
    855 30    7:           SEQUENCE {
    857 06    5:             OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
                :               (OIW)
                :             }
    864 30    9:           SEQUENCE {
    866 06    7:             OBJECT IDENTIFIER
                :               dsaWithSha1 (1 2 840 10040 4 3)
                :               (ANSI X9.57 algorithm)
                :             }
    875 04   46:           OCTET STRING, encapsulates {
    877 30   44:               SEQUENCE {
    879 02   20:                 INTEGER
                :                   09 91 FE EB D2 69 F5 18 B7 D7 CD 55
                :                   F4 81 EA 2A 42 6A AD 03
    901 02   20:                 INTEGER
                :                   3A 07 CC C3 21 BE E1 1A 4B 7F 3E B5
                :                   0D DB BA 1C EA BC CD 89
                :                 }
                :               }
                :             }
                :           }
                :         }
                :       }
                :     }
                :   }
```

4.2. Basic Signed Content, RSA

Same as 4.1, except using RSA signatures. A SignedData with no attribute certificates, signed by Alice using RSA, just her certificate (not Carl's root cert), no CRL. The message is ExContent, and is included in the eContent. There are no signed or unsigned attributes.

```
     0 30  850: SEQUENCE {
     4 06    9:   OBJECT IDENTIFIER signedData (1 2 840 113549 1 7 2)
               :     (PKCS #7)
    15 A0  835:   [0] {
    19 30  831:     SEQUENCE {
    23 02    1:       INTEGER 1
    26 31   11:       SET {
    28 30    9:         SEQUENCE {
    30 06    5:           OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
               :             (OIW)
    37 05    0:           NULL
               :           }
               :         }
```

```
 39 30   43:       SEQUENCE {
 41 06    9:         OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
             :           (PKCS #7)
 52 A0   30:         [0] {
 54 04   28:           OCTET STRING 'This is some sample content.'
             :           }
             :         }
 84 A0  560:       [0] {
 88 30  556:         SEQUENCE {
 92 30  405:           SEQUENCE {
 96 A0    3:             [0] {
 98 02    1:               INTEGER 2
             :               }
101 02   16:             INTEGER
             :               46 34 6B C7 80 00 56 BC 11 D3 6E 2E
             :               C4 10 B3 B0
119 30   13:             SEQUENCE {
121 06    9:               OBJECT IDENTIFIER
             :                 sha1withRSAEncryption
             :                     (1 2 840 113549 1 1 5)
             :               (PKCS #1)
132 05    0:               NULL
             :               }
134 30   18:             SEQUENCE {
136 31   16:               SET {
138 30   14:                 SEQUENCE {
140 06    3:                   OBJECT IDENTIFIER
             :                     commonName (2 5 4 3)
             :                     (X.520 id-at (2 5 4))
145 13    7:                   PrintableString 'CarlRSA'
             :                   }
             :                 }
             :               }
154 30   30:             SEQUENCE {
156 17   13:               UTCTime '990919010847Z'
171 17   13:               UTCTime '391231235959Z'
             :               }
186 30   19:             SEQUENCE {
188 31   17:               SET {
190 30   15:                 SEQUENCE {
192 06    3:                   OBJECT IDENTIFIER
             :                     commonName (2 5 4 3)
             :                     (X.520 id-at (2 5 4))
197 13    8:                   PrintableString 'AliceRSA'
             :                   }
             :                 }
             :               }
207 30  159:             SEQUENCE {
```

```
    210 30   13:               SEQUENCE {
    212 06    9:                 OBJECT IDENTIFIER
                :                   rsaEncryption (1 2 840 113549 1 1 1)
                :                   (PKCS #1)
    223 05    0:                 NULL
                :                 }
    225 03  141:               BIT STRING 0 unused bits, encapsulates {
    229 30  137:                   SEQUENCE {
    232 02  129:                     INTEGER
                :                     00 E0 89 73 39 8D D8 F5 F5 E8 87 76
                :                     39 7F 4E B0 05 BB 53 83 DE 0F B7 AB
                :                     DC 7D C7 75 29 0D 05 2E 6D 12 DF A6
                :                     86 26 D4 D2 6F AA 58 29 FC 97 EC FA
                :                     82 51 0F 30 80 BE B1 50 9E 46 44 F1
                :                     2C BB D8 32 CF C6 68 6F 07 D9 B0 60
                :                     AC BE EE 34 09 6A 13 F5 F7 05 05 93
                :                     DF 5E BA 35 56 D9 61 FF 19 7F C9 81
                :                     E6 F8 6C EA 87 40 70 EF AC 6D 2C 74
                :                     9F 2D FA 55 3A B9 99 77 02 A6 48 52
                :                     8C 4E F3 57 38 57 74 57 5F
    364 02    3:                     INTEGER 65537
                :                     }
                :                   }
                :                 }
    369 A3  129:               [3] {
    372 30  127:                 SEQUENCE {
    374 30   12:                   SEQUENCE {
    376 06    3:                     OBJECT IDENTIFIER
                :                       basicConstraints (2 5 29 19)
                :                       (X.509 id-ce (2 5 29))
    381 01    1:                     BOOLEAN TRUE
    384 04    2:                     OCTET STRING, encapsulates {
    386 30    0:                       SEQUENCE {}
                :                       }
                :                     }
    388 30   14:                   SEQUENCE {
    390 06    3:                     OBJECT IDENTIFIER
                :                       keyUsage (2 5 29 15)
                :                       (X.509 id-ce (2 5 29))
    395 01    1:                     BOOLEAN TRUE
    398 04    4:                     OCTET STRING, encapsulates {
    400 03    2:                       BIT STRING 6 unused bits
                :                         '11'B
                :                       }
                :                     }
    404 30   31:                   SEQUENCE {
    406 06    3:                     OBJECT IDENTIFIER
                :                       authorityKeyIdentifier (2 5 29 35)
```

```
                :                   (X.509 id-ce (2 5 29))
    411 04   24:                  OCTET STRING, encapsulates {
    413 30   22:                      SEQUENCE {
    415 80   20:                        [0]
                :                   E9 E0 90 27 AC 78 20 7A 9A D3 4C F2
                :                   42 37 4E 22 AE 9E 38 BB
                :                        }
                :                    }
                :                  }
    437 30   29:                SEQUENCE {
    439 06    3:                  OBJECT IDENTIFIER
                :                    subjectKeyIdentifier (2 5 29 14)
                :                    (X.509 id-ce (2 5 29))
    444 04   22:                  OCTET STRING, encapsulates {
    446 04   20:                      OCTET STRING
                :                   77 D2 B4 D1 B7 4C 8A 8A A3 CE 45 9D
                :                   CE EC 3C A0 3A E3 FF 50
                :                      }
                :                  }
    468 30   31:                SEQUENCE {
    470 06    3:                  OBJECT IDENTIFIER
                :                    subjectAltName (2 5 29 17)
                :                    (X.509 id-ce (2 5 29))
    475 04   24:                  OCTET STRING, encapsulates {
    477 30   22:                      SEQUENCE {
    479 81   20:                        [1] 'AliceRSA@example.com'
                :                      }
                :                    }
                :                  }
                :                }
                :              }
                :            }
    501 30   13:          SEQUENCE {
    503 06    9:            OBJECT IDENTIFIER
                :              sha1withRSAEncryption
                :                  (1 2 840 113549 1 1 5)
                :            (PKCS #1)
    514 05    0:            NULL
                :            }
    516 03  129:          BIT STRING 0 unused bits
                :            3E 70 47 A8 48 CC 13 58 8F CA 51 71
                :            6B 4E 36 18 5D 04 7E 80 B1 8D 4D CC
                :            CA A3 8F CC 7D 56 C8 BC CF 6E B3 1C
                :            59 A9 20 AA 05 81 A8 4E 25 AD A7 70
                :            14 75 2F F5 C7 9B D1 0E E9 63 D2 64
                :            B7 C6 66 6E 73 21 54 DF F4 BA 25 5D
                :            7D 49 D3 94 6B 22 36 74 73 B8 4A EC
                :            2F 64 ED D3 3D D2 A7 42 C5 E8 37 8A
```

```
                :             B4 DB 9F 67 E4 BD 9F F9 FE 74 EF EA
                :             F9 EE 63 6A D8 3F 4B 25 09 B5 D8 1A
                :             76 AE EB 9B DB 49 B0 22
                :           }
                :         }
    648 31  203:       SET {
    651 30  200:         SEQUENCE {
    654 02    1:           INTEGER 1
    657 30   38:           SEQUENCE {
    659 30   18:             SEQUENCE {
    661 31   16:               SET {
    663 30   14:                 SEQUENCE {
    665 06    3:                   OBJECT IDENTIFIER
                :                     commonName (2 5 4 3)
                :                     (X.520 id-at (2 5 4))
    670 13    7:                   PrintableString 'CarlRSA'
                :                   }
                :                 }
                :               }
    679 02   16:             INTEGER
                :               46 34 6B C7 80 00 56 BC 11 D3 6E 2E
                :               C4 10 B3 B0
                :             }
    697 30    9:           SEQUENCE {
    699 06    5:             OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
                :               (OIW)
    706 05    0:             NULL
                :             }
    708 30   13:           SEQUENCE {
    710 06    9:             OBJECT IDENTIFIER
                :               rsaEncryption (1 2 840 113549 1 1 1)
                :               (PKCS #1)
    721 05    0:             NULL
                :             }
    723 04  128:           OCTET STRING
                :             2F 23 82 D2 F3 09 5F B8 0C 58 EB 4E
                :             9D BF 89 9A 81 E5 75 C4 91 3D D3 D0
                :             D5 7B B6 D5 FE 94 A1 8A AC E3 C4 84
                :             F5 CD 60 4E 27 95 F6 CF 00 86 76 75
                :             3F 2B F0 E7 D4 02 67 A7 F5 C7 8D 16
                :             04 A5 B3 B5 E7 D9 32 F0 24 EF E7 20
                :             44 D5 9F 07 C5 53 24 FA CE 01 1D 0F
                :             17 13 A7 2A 95 9D 2B E4 03 95 14 0B
                :             E9 39 0D BA CE 6E 9C 9E 0C E8 98 E6
                :             55 13 D4 68 6F D0 07 D7 A2 B1 62 4C
                :             E3 8F AF FD E0 D5 5D C7
                :           }
                :         }
```

```
              :       }
              :     }
              :   }
```

4.3. Basic Signed Content, Detached Content

Same as 4.1, except with no eContent. A SignedData with no attribute certificates, signed by Alice using DSS, just her certificate (not Carl's root cert), no CRL. The message is ExContent, but the eContent is not included. There are no signed or unsigned attributes.

```
   0 30  887: SEQUENCE {
   4 06    9:   OBJECT IDENTIFIER signedData (1 2 840 113549 1 7 2)
             :     (PKCS #7)
  15 A0  872:   [0] {
  19 30  868:     SEQUENCE {
  23 02    1:       INTEGER 1
  26 31    9:       SET {
  28 30    7:         SEQUENCE {
  30 06    5:           OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
             :             (OIW)
             :           }
             :         }
  37 30   11:       SEQUENCE {
  39 06    9:         OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
             :           (PKCS #7)
             :         }
  50 A0  736:       [0] {
  54 30  732:         SEQUENCE {
  58 30  667:           SEQUENCE {
  62 A0    3:             [0] {
  64 02    1:               INTEGER 2
             :               }
  67 02    2:             INTEGER 200
  71 30    9:             SEQUENCE {
  73 06    7:               OBJECT IDENTIFIER
             :                 dsaWithSha1 (1 2 840 10040 4 3)
             :                 (ANSI X9.57 algorithm)
             :               }
  82 30   18:             SEQUENCE {
  84 31   16:               SET {
  86 30   14:                 SEQUENCE {
  88 06    3:                   OBJECT IDENTIFIER
             :                     commonName (2 5 4 3)
             :                     (X.520 id-at (2 5 4))
  93 13    7:                   PrintableString 'CarlDSS'
             :                   }
```

```
             :                 }
             :               }
    102 30   30:             SEQUENCE {
    104 17   13:               UTCTime '990817011049Z'
    119 17   13:               UTCTime '391231235959Z'
             :               }
    134 30   19:             SEQUENCE {
    136 31   17:               SET {
    138 30   15:                 SEQUENCE {
    140 06    3:                   OBJECT IDENTIFIER
             :                     commonName (2 5 4 3)
             :                     (X.520 id-at (2 5 4))
    145 13    8:                   PrintableString 'AliceDSS'
             :                   }
             :                 }
             :               }
    155 30  438:             SEQUENCE {
    159 30  299:               SEQUENCE {
    163 06    7:                 OBJECT IDENTIFIER
             :                   dsa (1 2 840 10040 4 1)
             :                   (ANSI X9.57 algorithm)
    172 30  286:                 SEQUENCE {
    176 02  129:                   INTEGER
             :                     00 81 8D CD ED 83 EA 0A 9E 39 3E C2
             :                     48 28 A3 E4 47 93 DD 0E D7 A8 0E EC
             :                     53 C5 AB 84 08 4F FF 94 E1 73 48 7E
             :                     0C D6 F3 44 48 D1 FE 9F AF A4 A1 89
             :                     2F E1 D9 30 C8 36 DE 3F 9B BF B7 4C
             :                     DC 5F 69 8A E4 75 D0 37 0C 91 08 95
             :                     9B DE A7 5E F9 FC F4 9F 2F DD 43 A8
             :                     8B 54 F1 3F B0 07 08 47 4D 5D 88 C3
             :                     C3 B5 B3 E3 55 08 75 D5 39 76 10 C4
             :                     78 BD FF 9D B0 84 97 37 F2 E4 51 1B
             :                     B5 E4 09 96 5C F3 7E 5B DB
    308 02   21:                   INTEGER
             :                     00 E2 47 A6 1A 45 66 B8 13 C6 DA 8F
             :                     B8 37 21 2B 62 8B F7 93 CD
    331 02  128:                   INTEGER
             :                     26 38 D0 14 89 32 AA 39 FB 3E 6D D9
             :                     4B 59 6A 4C 76 23 39 04 02 35 5C F2
             :                     CB 1A 30 C3 1E 50 5D DD 9B 59 E2 CD
             :                     AA 05 3D 58 C0 7B A2 36 B8 6E 07 AF
             :                     7D 8A 42 25 A7 F4 75 CF 4A 08 5E 4B
             :                     3E 90 F8 6D EA 9C C9 21 8A 3B 76 14
             :                     E9 CE 2E 5D A3 07 CD 23 85 B8 2F 30
             :                     01 7C 6D 49 89 11 89 36 44 BD F8 C8
             :                     95 4A 53 56 B5 E2 F9 73 EC 1A 61 36
             :                     1F 11 7F C2 BD ED D1 50 FF 98 74 C2
```

```
                :                   D1 81 4A 60 39 BA 36 39
                :                   }
                :                 }
    462 03  132:                BIT STRING 0 unused bits, encapsulates {
    466 02  128:                    INTEGER
                :                   5C E3 B9 5A 75 14 96 0B A9 7A DD E3
                :                   3F A9 EC AC 5E DC BD B7 13 11 34 A6
                :                   16 89 28 11 23 D9 34 86 67 75 75 13
                :                   12 3D 43 5B 6F E5 51 BF FA 89 F2 A2
                :                   1B 3E 24 7D 3D 07 8D 5B 63 C8 BB 45
                :                   A5 A0 4A E3 85 D6 CE 06 80 3F E8 23
                :                   7E 1A F2 24 AB 53 1A B8 27 0D 1E EF
                :                   08 BF 66 14 80 5C 62 AC 65 FA 15 8B
                :                   F1 BB 34 D4 D2 96 37 F6 61 47 B2 C4
                :                   32 84 F0 7E 41 40 FD 46 A7 63 4E 33
                :                   F2 A5 E2 F4 F2 83 E5 B8
                :                   }
                :                 }
    597 A3  129:              [3] {
    600 30  127:                SEQUENCE {
    602 30   12:                  SEQUENCE {
    604 06    3:                    OBJECT IDENTIFIER
                :                     basicConstraints (2 5 29 19)
                :                     (X.509 id-ce (2 5 29))
    609 01    1:                    BOOLEAN TRUE
    612 04    2:                    OCTET STRING, encapsulates {
    614 30    0:                      SEQUENCE {}
                :                     }
                :                   }
    616 30   14:                  SEQUENCE {
    618 06    3:                    OBJECT IDENTIFIER
                :                     keyUsage (2 5 29 15)
                :                     (X.509 id-ce (2 5 29))
    623 01    1:                    BOOLEAN TRUE
    626 04    4:                    OCTET STRING, encapsulates {
    628 03    2:                      BIT STRING 6 unused bits
                :                       '11'B
                :                     }
                :                   }
    632 30   31:                  SEQUENCE {
    634 06    3:                    OBJECT IDENTIFIER
                :                     authorityKeyIdentifier (2 5 29 35)
                :                     (X.509 id-ce (2 5 29))
    639 04   24:                    OCTET STRING, encapsulates {
    641 30   22:                      SEQUENCE {
    643 80   20:                        [0]
                :                     70 44 3E 82 2E 6F 87 DE 4A D3 75 E3
                :                     3D 20 BC 43 2B 93 F1 1F
```

```
                :                       }
                :                     }
                :                   }
    665 30   29:                   SEQUENCE {
    667 06    3:                     OBJECT IDENTIFIER
                :                       subjectKeyIdentifier (2 5 29 14)
                :                       (X.509 id-ce (2 5 29))
    672 04   22:                     OCTET STRING, encapsulates {
    674 04   20:                         OCTET STRING
                :                     BE 6C A1 B3 E3 C1 F7 ED 43 70 A4 CE
                :                     13 01 E2 FD E3 97 FE CD
                :                         }
                :                   }
    696 30   31:                   SEQUENCE {
    698 06    3:                     OBJECT IDENTIFIER
                :                       subjectAltName (2 5 29 17)
                :                       (X.509 id-ce (2 5 29))
    703 04   24:                     OCTET STRING, encapsulates {
    705 30   22:                       SEQUENCE {
    707 81   20:                         [1] 'AliceDSS@example.com'
                :                       }
                :                     }
                :                   }
                :                 }
                :               }
                :             }
    729 30    9:           SEQUENCE {
    731 06    7:             OBJECT IDENTIFIER
                :               dsaWithSha1 (1 2 840 10040 4 3)
                :               (ANSI X9.57 algorithm)
                :             }
    740 03   48:           BIT STRING 0 unused bits, encapsulates {
    743 30   45:             SEQUENCE {
    745 02   20:               INTEGER
                :                 55 0C A4 19 1F 42 2B 89 71 22 33 8D
                :                 83 6A B5 3D 67 6B BF 45
    767 02   21:               INTEGER
                :                 00 9F 61 53 52 54 0B 5C B2 DD DA E7
                :                 76 1D E2 10 52 5B 43 5E BD
                :               }
                :             }
                :           }
                :         }
    790 31   99:       SET {
    792 30   97:         SEQUENCE {
    794 02    1:           INTEGER 1
    797 30   24:           SEQUENCE {
    799 30   18:             SEQUENCE {
```

```
    801 31   16:               SET {
    803 30   14:                 SEQUENCE {
    805 06    3:                   OBJECT IDENTIFIER
              :                     commonName (2 5 4 3)
              :                     (X.520 id-at (2 5 4))
    810 13    7:                   PrintableString 'CarlDSS'
              :                   }
              :                 }
              :               }
    819 02    2:             INTEGER 200
              :             }
    823 30    7:           SEQUENCE {
    825 06    5:             OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
              :               (OIW)
              :             }
    832 30    9:           SEQUENCE {
    834 06    7:             OBJECT IDENTIFIER
              :               dsaWithSha1 (1 2 840 10040 4 3)
              :               (ANSI X9.57 algorithm)
              :             }
    843 04   46:           OCTET STRING, encapsulates {
    845 30   44:               SEQUENCE {
    847 02   20:                 INTEGER
              :                   06 FB C7 2A 24 D5 34 89 F7 8B B5 FD
              :                   73 24 A5 86 C8 0F 5A 6C
    869 02   20:                 INTEGER
              :                   66 69 19 BC 68 58 D1 8D B1 9D 52 3F
              :                   DA 14 88 0D FD C9 A1 B8
              :                 }
              :               }
              :             }
              :           }
              :         }
              :       }
              :     }
              :   }
```

4.4. Fancier Signed Content

Same as 4.1, but includes Carl's root cert, Carl's CRL, some signed and unsigned attributes (Countersignature by Diane). A SignedData with no attribute certificates, signed by Alice using DSS, her certificate and Carl's root cert, Carl's DSS CRL. The message is ExContent, and is included in the eContent. The signed attributes are Content Type, Message Digest and Signing Time; the unsigned attributes are content hint and counter signature. The message includes also Alice's RSA certificate.

```
    0 30 2829: SEQUENCE {
    4 06    9:   OBJECT IDENTIFIER signedData (1 2 840 113549 1 7 2)
             :     (PKCS #7)
   15 A0 2814:   [0] {
   19 30 2810:     SEQUENCE {
   23 02    1:       INTEGER 1
   26 31    9:       SET {
   28 30    7:         SEQUENCE {
   30 06    5:           OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
             :             (OIW)
             :           }
             :         }
   37 30   43:       SEQUENCE {
   39 06    9:         OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
             :           (PKCS #7)
   50 A0   30:         [0] {
   52 04   28:           OCTET STRING 'This is some sample content.'
             :           }
             :         }
   82 A0 1967:       [0] {
   86 30  556:         SEQUENCE {
   90 30  405:           SEQUENCE {
   94 A0    3:             [0] {
   96 02    1:               INTEGER 2
             :               }
   99 02   16:             INTEGER
             :               46 34 6B C7 80 00 56 BC 11 D3 6E 2E
             :               C4 10 B3 B0
  117 30   13:             SEQUENCE {
  119 06    9:               OBJECT IDENTIFIER
             :                 sha1withRSAEncryption
             :                     (1 2 840 113549 1 1 5)
             :               (PKCS #1)
  130 05    0:               NULL
             :               }
  132 30   18:             SEQUENCE {
  134 31   16:               SET {
  136 30   14:                 SEQUENCE {
  138 06    3:                   OBJECT IDENTIFIER
             :                     commonName (2 5 4 3)
             :                     (X.520 id-at (2 5 4))
  143 13    7:                   PrintableString 'CarlRSA'
             :                   }
             :                 }
             :               }
  152 30   30:             SEQUENCE {
  154 17   13:               UTCTime '990919010847Z'
  169 17   13:               UTCTime '391231235959Z'
```

```
             :             }
    184 30   19:           SEQUENCE {
    186 31   17:             SET {
    188 30   15:               SEQUENCE {
    190 06    3:                 OBJECT IDENTIFIER
             :                   commonName (2 5 4 3)
             :                   (X.520 id-at (2 5 4))
    195 13    8:                 PrintableString 'AliceRSA'
             :                 }
             :               }
             :             }
    205 30  159:           SEQUENCE {
    208 30   13:             SEQUENCE {
    210 06    9:               OBJECT IDENTIFIER
             :                 rsaEncryption (1 2 840 113549 1 1 1)
             :                 (PKCS #1)
    221 05    0:               NULL
             :               }
    223 03  141:             BIT STRING 0 unused bits, encapsulates {
    227 30  137:               SEQUENCE {
    230 02  129:                 INTEGER
             :                   00 E0 89 73 39 8D D8 F5 F5 E8 87 76
             :                   39 7F 4E B0 05 BB 53 83 DE 0F B7 AB
             :                   DC 7D C7 75 29 0D 05 2E 6D 12 DF A6
             :                   86 26 D4 D2 6F AA 58 29 FC 97 EC FA
             :                   82 51 0F 30 80 BE B1 50 9E 46 44 F1
             :                   2C BB D8 32 CF C6 68 6F 07 D9 B0 60
             :                   AC BE EE 34 09 6A 13 F5 F7 05 05 93
             :                   DF 5E BA 35 56 D9 61 FF 19 7F C9 81
             :                   E6 F8 6C EA 87 40 70 EF AC 6D 2C 74
             :                   9F 2D FA 55 3A B9 99 77 02 A6 48 52
             :                   8C 4E F3 57 38 57 74 57 5F
    362 02    3:                 INTEGER 65537
             :                 }
             :               }
             :             }
    367 A3  129:           [3] {
    370 30  127:             SEQUENCE {
    372 30   12:               SEQUENCE {
    374 06    3:                 OBJECT IDENTIFIER
             :                   basicConstraints (2 5 29 19)
             :                   (X.509 id-ce (2 5 29))
    379 01    1:                 BOOLEAN TRUE
    382 04    2:                 OCTET STRING, encapsulates {
    384 30    0:                   SEQUENCE {}
             :                   }
             :                 }
    386 30   14:               SEQUENCE {
```

```
    388 06    3:                  OBJECT IDENTIFIER
                :                    keyUsage (2 5 29 15)
                :                    (X.509 id-ce (2 5 29))
    393 01    1:                  BOOLEAN TRUE
    396 04    4:                  OCTET STRING, encapsulates {
    398 03    2:                      BIT STRING 6 unused bits
                :                        '11'B
                :                    }
                :                  }
    402 30   31:                SEQUENCE {
    404 06    3:                  OBJECT IDENTIFIER
                :                    authorityKeyIdentifier (2 5 29 35)
                :                    (X.509 id-ce (2 5 29))
    409 04   24:                  OCTET STRING, encapsulates {
    411 30   22:                      SEQUENCE {
    413 80   20:                        [0]
                :                    E9 E0 90 27 AC 78 20 7A 9A D3 4C F2
                :                    42 37 4E 22 AE 9E 38 BB
                :                        }
                :                    }
                :                  }
    435 30   29:                SEQUENCE {
    437 06    3:                  OBJECT IDENTIFIER
                :                    subjectKeyIdentifier (2 5 29 14)
                :                    (X.509 id-ce (2 5 29))
    442 04   22:                  OCTET STRING, encapsulates {
    444 04   20:                      OCTET STRING
                :                    77 D2 B4 D1 B7 4C 8A 8A A3 CE 45 9D
                :                    CE EC 3C A0 3A E3 FF 50
                :                      }
                :                  }
    466 30   31:                SEQUENCE {
    468 06    3:                  OBJECT IDENTIFIER
                :                    subjectAltName (2 5 29 17)
                :                    (X.509 id-ce (2 5 29))
    473 04   24:                  OCTET STRING, encapsulates {
    475 30   22:                      SEQUENCE {
    477 81   20:                        [1] 'AliceRSA@example.com'
                :                        }
                :                    }
                :                  }
                :                }
                :              }
                :            }
    499 30   13:          SEQUENCE {
    501 06    9:            OBJECT IDENTIFIER
                :              sha1withRSAEncryption
                :                  (1 2 840 113549 1 1 5)
```

```
                :              (PKCS #1)
    512 05    0:            NULL
                :            }
    514 03  129:          BIT STRING 0 unused bits
                :            3E 70 47 A8 48 CC 13 58 8F CA 51 71
                :            6B 4E 36 18 5D 04 7E 80 B1 8D 4D CC
                :            CA A3 8F CC 7D 56 C8 BC CF 6E B3 1C
                :            59 A9 20 AA 05 81 A8 4E 25 AD A7 70
                :            14 75 2F F5 C7 9B D1 0E E9 63 D2 64
                :            B7 C6 66 6E 73 21 54 DF F4 BA 25 5D
                :            7D 49 D3 94 6B 22 36 74 73 B8 4A EC
                :            2F 64 ED D3 3D D2 A7 42 C5 E8 37 8A
                :            B4 DB 9F 67 E4 BD 9F F9 FE 74 EF EA
                :            F9 EE 63 6A D8 3F 4B 25 09 B5 D8 1A
                :            76 AE EB 9B DB 49 B0 22
                :          }
    646 30  667:         SEQUENCE {
    650 30  602:           SEQUENCE {
    654 A0    3:             [0] {
    656 02    1:               INTEGER 2
                :              }
    659 02    1:             INTEGER 1
    662 30    9:             SEQUENCE {
    664 06    7:               OBJECT IDENTIFIER
                :                dsaWithSha1 (1 2 840 10040 4 3)
                :                (ANSI X9.57 algorithm)
                :              }
    673 30   18:             SEQUENCE {
    675 31   16:               SET {
    677 30   14:                 SEQUENCE {
    679 06    3:                   OBJECT IDENTIFIER
                :                     commonName (2 5 4 3)
                :                     (X.520 id-at (2 5 4))
    684 13    7:                   PrintableString 'CarlDSS'
                :                   }
                :                 }
                :               }
    693 30   30:             SEQUENCE {
    695 17   13:               UTCTime '990816225050Z'
    710 17   13:               UTCTime '391231235959Z'
                :              }
    725 30   18:             SEQUENCE {
    727 31   16:               SET {
    729 30   14:                 SEQUENCE {
    731 06    3:                   OBJECT IDENTIFIER
                :                     commonName (2 5 4 3)
                :                     (X.520 id-at (2 5 4))
    736 13    7:                   PrintableString 'CarlDSS'
```

```
                :                   }
                :                 }
                :               }
    745 30  439:              SEQUENCE {
    749 30  299:                SEQUENCE {
    753 06    7:                  OBJECT IDENTIFIER
                :                    dsa (1 2 840 10040 4 1)
                :                    (ANSI X9.57 algorithm)
    762 30  286:                  SEQUENCE {
    766 02  129:                    INTEGER
                :                    00 B6 49 18 3E 8A 44 C1 29 71 94 4C
                :                    01 C4 12 C1 7A 79 CB 54 4D AB 1E 81
                :                    FB C6 4C B3 0E 94 09 06 EB 01 D4 B1
                :                    C8 71 4B C7 45 C0 50 25 5D 9C FC DA
                :                    E4 6D D3 E2 86 48 84 82 7D BA 15 95
                :                    4A 16 F6 46 ED DD F6 98 D2 BB 7E 8A
                :                    0A 8A BA 16 7B B9 50 01 48 93 8B EB
                :                    25 15 51 97 55 DC 8F 53 0E 10 A9 50
                :                    FC 70 B7 CD 30 54 FD DA DE A8 AA 22
                :                    B5 A1 AF 8B CC 02 88 E7 8B 70 5F B9
                :                    AD E1 08 D4 6D 29 2D D6 E9
    898 02   21:                    INTEGER
                :                    00 DD C1 2F DF 53 CE 0B 34 60 77 3E
                :                    02 A4 BF 8A 5D 98 B9 10 D5
    921 02  128:                    INTEGER
                :                    0C EE 57 9B 4B BD DA B6 07 6A 74 37
                :                    4F 55 7F 9D ED BC 61 0D EB 46 59 3C
                :                    56 0B 2B 5B 0C 91 CE A5 62 52 69 CA
                :                    E1 6D 3E BD BF FE E1 B7 B9 2B 61 3C
                :                    AD CB AE 45 E3 06 AC 8C 22 9D 9C 44
                :                    87 0B C7 CD F0 1C D9 B5 4E 5D 73 DE
                :                    AF 0E C9 1D 5A 51 F5 4F 44 79 35 5A
                :                    73 AA 7F 46 51 1F A9 42 16 9C 48 EB
                :                    8A 79 61 B4 D5 2F 53 22 44 63 1F 86
                :                    B8 A3 58 06 25 F8 29 C0 EF BA E0 75
                :                    F0 42 C4 63 65 52 9B 0A
                :                    }
                :                  }
   1052 03  133:                  BIT STRING 0 unused bits, encapsulates {
   1056 02  129:                    INTEGER
                :                    00 99 87 74 27 03 66 A0 B1 C0 AD DC
                :                    2C 75 BB E1 6C 44 9C DA 21 6D 4D 47
                :                    6D B1 62 09 E9 D8 AE 1E F2 3A B4 94
                :                    B1 A3 8E 7A 9B 71 4E 00 94 C9 B4 25
                :                    4E B9 60 96 19 24 01 F3 62 0C FE 75
                :                    C0 FB CE D8 68 00 E3 FD D5 70 4F DF
                :                    23 96 19 06 94 F4 B1 61 8F 3A 57 B1
                :                    08 11 A4 0B 26 25 F0 52 76 81 EA 0B
```

```
              :                 62 0D 95 2A E6 86 BA 72 B2 A7 50 83
              :                 0B AA 27 CD 1B A9 4D 89 9A D7 8D 18
              :                 39 84 3F 8B C5 56 4D 80 7A
              :                 }
              :               }
  1188 A3   66:             [3] {
  1190 30   64:               SEQUENCE {
  1192 30   15:                 SEQUENCE {
  1194 06    3:                   OBJECT IDENTIFIER
              :                     basicConstraints (2 5 29 19)
              :                     (X.509 id-ce (2 5 29))
  1199 01    1:                   BOOLEAN TRUE
  1202 04    5:                   OCTET STRING, encapsulates {
  1204 30    3:                       SEQUENCE {
  1206 01    1:                         BOOLEAN TRUE
              :                         }
              :                       }
              :                   }
  1209 30   14:                 SEQUENCE {
  1211 06    3:                   OBJECT IDENTIFIER
              :                     keyUsage (2 5 29 15)
              :                     (X.509 id-ce (2 5 29))
  1216 01    1:                   BOOLEAN TRUE
  1219 04    4:                   OCTET STRING, encapsulates {
  1221 03    2:                       BIT STRING 1 unused bits
              :                         '1100001'B
              :                       }
              :                   }
  1225 30   29:                 SEQUENCE {
  1227 06    3:                   OBJECT IDENTIFIER
              :                     subjectKeyIdentifier (2 5 29 14)
              :                     (X.509 id-ce (2 5 29))
  1232 04   22:                   OCTET STRING, encapsulates {
  1234 04   20:                       OCTET STRING
              :                     70 44 3E 82 2E 6F 87 DE 4A D3 75 E3
              :                     3D 20 BC 43 2B 93 F1 1F
              :                       }
              :                   }
              :                 }
              :               }
  1256 30    9:             SEQUENCE {
  1258 06    7:               OBJECT IDENTIFIER
              :                 dsaWithSha1 (1 2 840 10040 4 3)
              :                 (ANSI X9.57 algorithm)
              :               }
  1267 03   48:             BIT STRING 0 unused bits, encapsulates {
  1270 30   45:               SEQUENCE {
```

```
   1272 02   20:                INTEGER
                :                  6B A9 F0 4E 7A 5A 79 E3 F9 BE 3D 2B
                :                  C9 06 37 E9 11 17 A1 13
   1294 02   21:                INTEGER
                :                  00 8F 34 69 2A 8B B1 3C 03 79 94 32
                :                  4D 12 1F CE 89 FB 46 B2 3B
                :                }
                :              }
                :            }
   1317 30  732:          SEQUENCE {
   1321 30  667:            SEQUENCE {
   1325 A0    3:              [0] {
   1327 02    1:                INTEGER 2
                :                }
   1330 02    2:              INTEGER 200
   1334 30    9:              SEQUENCE {
   1336 06    7:                OBJECT IDENTIFIER
                :                  dsaWithSha1 (1 2 840 10040 4 3)
                :                  (ANSI X9.57 algorithm)
                :                }
   1345 30   18:              SEQUENCE {
   1347 31   16:                SET {
   1349 30   14:                  SEQUENCE {
   1351 06    3:                    OBJECT IDENTIFIER
                :                      commonName (2 5 4 3)
                :                      (X.520 id-at (2 5 4))
   1356 13    7:                    PrintableString 'CarlDSS'
                :                    }
                :                  }
                :                }
   1365 30   30:              SEQUENCE {
   1367 17   13:                UTCTime '990817011049Z'
   1382 17   13:                UTCTime '391231235959Z'
                :                }
   1397 30   19:              SEQUENCE {
   1399 31   17:                SET {
   1401 30   15:                  SEQUENCE {
   1403 06    3:                    OBJECT IDENTIFIER
                :                      commonName (2 5 4 3)
                :                      (X.520 id-at (2 5 4))
   1408 13    8:                    PrintableString 'AliceDSS'
                :                    }
                :                  }
                :                }
   1418 30  438:              SEQUENCE {
   1422 30  299:                SEQUENCE {
   1426 06    7:                  OBJECT IDENTIFIER
                :                    dsa (1 2 840 10040 4 1)
```

```
                :                   (ANSI X9.57 algorithm)
   1435 30  286:                  SEQUENCE {
   1439 02  129:                    INTEGER
                :                     00 81 8D CD ED 83 EA 0A 9E 39 3E C2
                :                     48 28 A3 E4 47 93 DD 0E D7 A8 0E EC
                :                     53 C5 AB 84 08 4F FF 94 E1 73 48 7E
                :                     0C D6 F3 44 48 D1 FE 9F AF A4 A1 89
                :                     2F E1 D9 30 C8 36 DE 3F 9B BF B7 4C
                :                     DC 5F 69 8A E4 75 D0 37 0C 91 08 95
                :                     9B DE A7 5E F9 FC F4 9F 2F DD 43 A8
                :                     8B 54 F1 3F B0 07 08 47 4D 5D 88 C3
                :                     C3 B5 B3 E3 55 08 75 D5 39 76 10 C4
                :                     78 BD FF 9D B0 84 97 37 F2 E4 51 1B
                :                     B5 E4 09 96 5C F3 7E 5B DB
   1571 02   21:                    INTEGER
                :                     00 E2 47 A6 1A 45 66 B8 13 C6 DA 8F
                :                     B8 37 21 2B 62 8B F7 93 CD
   1594 02  128:                    INTEGER
                :                     26 38 D0 14 89 32 AA 39 FB 3E 6D D9
                :                     4B 59 6A 4C 76 23 39 04 02 35 5C F2
                :                     CB 1A 30 C3 1E 50 5D DD 9B 59 E2 CD
                :                     AA 05 3D 58 C0 7B A2 36 B8 6E 07 AF
                :                     7D 8A 42 25 A7 F4 75 CF 4A 08 5E 4B
                :                     3E 90 F8 6D EA 9C C9 21 8A 3B 76 14
                :                     E9 CE 2E 5D A3 07 CD 23 85 B8 2F 30
                :                     01 7C 6D 49 89 11 89 36 44 BD F8 C8
                :                     95 4A 53 56 B5 E2 F9 73 EC 1A 61 36
                :                     1F 11 7F C2 BD ED D1 50 FF 98 74 C2
                :                     D1 81 4A 60 39 BA 36 39
                :                     }
                :                   }
   1725 03  132:                  BIT STRING 0 unused bits, encapsulates {
   1729 02  128:                    INTEGER
                :                     5C E3 B9 5A 75 14 96 0B A9 7A DD E3
                :                     3F A9 EC AC 5E DC BD B7 13 11 34 A6
                :                     16 89 28 11 23 D9 34 86 67 75 75 13
                :                     12 3D 43 5B 6F E5 51 BF FA 89 F2 A2
                :                     1B 3E 24 7D 3D 07 8D 5B 63 C8 BB 45
                :                     A5 A0 4A E3 85 D6 CE 06 80 3F E8 23
                :                     7E 1A F2 24 AB 53 1A B8 27 0D 1E EF
                :                     08 BF 66 14 80 5C 62 AC 65 FA 15 8B
                :                     F1 BB 34 D4 D2 96 37 F6 61 47 B2 C4
                :                     32 84 F0 7E 41 40 FD 46 A7 63 4E 33
                :                     F2 A5 E2 F4 F2 83 E5 B8
                :                     }
                :                 }
   1860 A3  129:                [3] {
   1863 30  127:                  SEQUENCE {
```

```
1865 30   12:                SEQUENCE {
1867 06    3:                  OBJECT IDENTIFIER
             :                    basicConstraints (2 5 29 19)
             :                    (X.509 id-ce (2 5 29))
1872 01    1:                  BOOLEAN TRUE
1875 04    2:                  OCTET STRING, encapsulates {
1877 30    0:                      SEQUENCE {}
             :                      }
             :                  }
1879 30   14:                SEQUENCE {
1881 06    3:                  OBJECT IDENTIFIER
             :                    keyUsage (2 5 29 15)
             :                    (X.509 id-ce (2 5 29))
1886 01    1:                  BOOLEAN TRUE
1889 04    4:                  OCTET STRING, encapsulates {
1891 03    2:                      BIT STRING 6 unused bits
             :                        '11'B
             :                      }
             :                  }
1895 30   31:                SEQUENCE {
1897 06    3:                  OBJECT IDENTIFIER
             :                    authorityKeyIdentifier (2 5 29 35)
             :                    (X.509 id-ce (2 5 29))
1902 04   24:                  OCTET STRING, encapsulates {
1904 30   22:                      SEQUENCE {
1906 80   20:                        [0]
             :                    70 44 3E 82 2E 6F 87 DE 4A D3 75 E3
             :                    3D 20 BC 43 2B 93 F1 1F
             :                        }
             :                      }
             :                  }
1928 30   29:                SEQUENCE {
1930 06    3:                  OBJECT IDENTIFIER
             :                    subjectKeyIdentifier (2 5 29 14)
             :                    (X.509 id-ce (2 5 29))
1935 04   22:                  OCTET STRING, encapsulates {
1937 04   20:                      OCTET STRING
             :                    BE 6C A1 B3 E3 C1 F7 ED 43 70 A4 CE
             :                    13 01 E2 FD E3 97 FE CD
             :                      }
             :                  }
1959 30   31:                SEQUENCE {
1961 06    3:                  OBJECT IDENTIFIER
             :                    subjectAltName (2 5 29 17)
             :                    (X.509 id-ce (2 5 29))
1966 04   24:                  OCTET STRING, encapsulates {
1968 30   22:                      SEQUENCE {
1970 81   20:                        [1] 'AliceDSS@example.com'
```

```
                :                         }
                :                       }
                :                     }
                :                   }
                :                 }
                :               }
   1992 30    9:             SEQUENCE {
   1994 06    7:               OBJECT IDENTIFIER
                :                 dsaWithSha1 (1 2 840 10040 4 3)
                :                 (ANSI X9.57 algorithm)
                :               }
   2003 03   48:             BIT STRING 0 unused bits, encapsulates {
   2006 30   45:               SEQUENCE {
   2008 02   20:                 INTEGER
                :                   55 0C A4 19 1F 42 2B 89 71 22 33 8D
                :                   83 6A B5 3D 67 6B BF 45
   2030 02   21:                 INTEGER
                :                   00 9F 61 53 52 54 0B 5C B2 DD DA E7
                :                   76 1D E2 10 52 5B 43 5E BD
                :                 }
                :               }
                :             }
                :           }
   2053 A1  219:         [1] {
   2056 30  216:           SEQUENCE {
   2059 30  153:             SEQUENCE {
   2062 30    9:               SEQUENCE {
   2064 06    7:                 OBJECT IDENTIFIER
                :                   dsaWithSha1 (1 2 840 10040 4 3)
                :                   (ANSI X9.57 algorithm)
                :                 }
   2073 30   18:               SEQUENCE {
   2075 31   16:                 SET {
   2077 30   14:                   SEQUENCE {
   2079 06    3:                     OBJECT IDENTIFIER
                :                       commonName (2 5 4 3)
                :                       (X.520 id-at (2 5 4))
   2084 13    7:                     PrintableString 'CarlDSS'
                :                     }
                :                   }
                :                 }
   2093 17   13:               UTCTime '990827070000Z'
   2108 30  105:               SEQUENCE {
   2110 30   19:                 SEQUENCE {
   2112 02    2:                   INTEGER 200
   2116 17   13:                   UTCTime '990822070000Z'
                :                   }
   2131 30   19:                 SEQUENCE {
```

```
   2133 02    2:                INTEGER 201
   2137 17   13:                UTCTime '990822070000Z'
              :                }
   2152 30   19:              SEQUENCE {
   2154 02    2:                INTEGER 211
   2158 17   13:                UTCTime '990822070000Z'
              :                }
   2173 30   19:              SEQUENCE {
   2175 02    2:                INTEGER 210
   2179 17   13:                UTCTime '990822070000Z'
              :                }
   2194 30   19:              SEQUENCE {
   2196 02    2:                INTEGER 212
   2200 17   13:                UTCTime '990824070000Z'
              :                }
              :              }
              :            }
   2215 30    9:           SEQUENCE {
   2217 06    7:             OBJECT IDENTIFIER
              :               dsaWithSha1 (1 2 840 10040 4 3)
              :               (ANSI X9.57 algorithm)
              :            }
   2226 03   47:           BIT STRING 0 unused bits, encapsulates {
   2229 30   44:             SEQUENCE {
   2231 02   20:               INTEGER
              :                 7E 65 52 76 33 FE 34 73 17 D1 F7 96
              :                 F9 A0 D4 D8 6D 5C 7D 3D
   2253 02   20:               INTEGER
              :                 02 7A 5B B7 D5 5B 18 C1 CF 87 EF 7E
              :                 DA 24 F3 2A 83 9C 35 A1
              :               }
              :             }
              :           }
              :         }
   2275 31  554:       SET {
   2279 30  550:         SEQUENCE {
   2283 02    1:           INTEGER 1
   2286 30   24:           SEQUENCE {
   2288 30   18:             SEQUENCE {
   2290 31   16:               SET {
   2292 30   14:                 SEQUENCE {
   2294 06    3:                   OBJECT IDENTIFIER
              :                     commonName (2 5 4 3)
              :                     (X.520 id-at (2 5 4))
   2299 13    7:                   PrintableString 'CarlDSS'
              :                   }
              :                 }
              :               }
```

```
   2308 02    2:             INTEGER 200
                :             }
   2312 30    7:           SEQUENCE {
   2314 06    5:             OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
                :               (OIW)
                :             }
   2321 A0   93:           [0] {
   2323 30   24:             SEQUENCE {
   2325 06    9:               OBJECT IDENTIFIER
                :                 contentType (1 2 840 113549 1 9 3)
                :                 (PKCS #9 (1 2 840 113549 1 9))
   2336 31   11:               SET {
   2338 06    9:                 OBJECT IDENTIFIER
                :                   data (1 2 840 113549 1 7 1)
                :                   (PKCS #7)
                :                 }
                :               }
   2349 30   28:             SEQUENCE {
   2351 06    9:               OBJECT IDENTIFIER
                :                 signingTime (1 2 840 113549 1 9 5)
                :                 (PKCS #9 (1 2 840 113549 1 9))
   2362 31   15:               SET {
   2364 17   13:                 UTCTime '030514153900Z'
                :                 }
                :               }
   2379 30   35:             SEQUENCE {
   2381 06    9:               OBJECT IDENTIFIER
                :                 messageDigest (1 2 840 113549 1 9 4)
                :                 (PKCS #9 (1 2 840 113549 1 9))
   2392 31   22:               SET {
   2394 04   20:                 OCTET STRING
                :                   40 6A EC 08 52 79 BA 6E 16 02 2D 9E
                :                   06 29 C0 22 96 87 DD 48
                :                 }
                :               }
                :             }
   2416 30    9:           SEQUENCE {
   2418 06    7:             OBJECT IDENTIFIER
                :               dsaWithSha1 (1 2 840 10040 4 3)
                :               (ANSI X9.57 algorithm)
                :             }
   2427 04   46:           OCTET STRING, encapsulates {
   2429 30   44:             SEQUENCE {
   2431 02   20:               INTEGER
                :                 3B A5 E0 4A DB 6D 58 E0 19 D1 00 1C
                :                 4F 44 9A 57 7A 71 66 68
   2453 02   20:               INTEGER
                :                 1A 11 98 D6 1F 1F AF 34 81 01 DE BE
```

```
                :                   8B DC B6 A8 6A 91 69 13
                :                 }
                :               }
   2475 A1  354:             [1] {
   2479 30   62:               SEQUENCE {
   2481 06   11:                 OBJECT IDENTIFIER
                :                   id-aa-contentHint
                :                       (1 2 840 113549 1 9 16 2 4)
                :                   (S/MIME Authenticated Attributes
                :                       (1 2 840 113549 1 9 16 2))
   2494 31   47:                 SET {
   2496 30   45:                   SEQUENCE {
   2498 0C   32:                     UTF8String
                :                     'Content Hints Description Buffer'
   2532 06    9:                     OBJECT IDENTIFIER
                :                       data (1 2 840 113549 1 7 1)
                :                       (PKCS #7)
                :                     }
                :                   }
                :                 }
   2543 30  286:               SEQUENCE {
   2547 06    9:                 OBJECT IDENTIFIER
                :                   countersignature (1 2 840 113549 1 9 6)
                :                   (PKCS #9 (1 2 840 113549 1 9))
   2558 31  271:                 SET {
   2562 30  267:                   SEQUENCE {
   2566 02    1:                     INTEGER 1
   2569 30   38:                     SEQUENCE {
   2571 30   18:                       SEQUENCE {
   2573 31   16:                         SET {
   2575 30   14:                           SEQUENCE {
   2577 06    3:                             OBJECT IDENTIFIER
                :                               commonName (2 5 4 3)
                :                               (X.520 id-at (2 5 4))
   2582 13    7:                             PrintableString 'CarlRSA'
                :                             }
                :                           }
                :                         }
   2591 02   16:                       INTEGER
                :                     46 34 6B C7 80 00 56 BC 11 D3 6E 2E
                :                     C4 10 B3 B0
                :                       }
   2609 30    7:                     SEQUENCE {
   2611 06    5:                       OBJECT IDENTIFIER
                :                         sha1 (1 3 14 3 2 26)
                :                         (OIW)
                :                       }
   2618 A0   67:                     [0] {
```

```
   2620 30   28:                    SEQUENCE {
   2622 06    9:                      OBJECT IDENTIFIER
              :                        signingTime
              :                            (1 2 840 113549 1 9 5)
              :                        (PKCS #9 (1 2 840 113549 1 9))
   2633 31   15:                      SET {
   2635 17   13:                        UTCTime '030514153900Z'
              :                        }
              :                      }
   2650 30   35:                    SEQUENCE {
   2652 06    9:                      OBJECT IDENTIFIER
              :                        messageDigest
              :                            (1 2 840 113549 1 9 4)
              :                        (PKCS #9 (1 2 840 113549 1 9))
   2663 31   22:                      SET {
   2665 04   20:                        OCTET STRING
              :                      02 5F 49 4E 39 98 50 85 B3 66 D3 8A
              :                      1F 7B 9E 69 AA FB D8 33
              :                        }
              :                      }
              :                    }
   2687 30   13:                    SEQUENCE {
   2689 06    9:                      OBJECT IDENTIFIER
              :                        rsaEncryption
              :                            (1 2 840 113549 1 1 1)
              :                        (PKCS #1)
   2700 05    0:                      NULL
              :                      }
   2702 04  128:                    OCTET STRING
              :                      6D AA 20 24 ED 7A EE A5 5E 87 DD 75
              :                      1F 2B 54 10 65 F4 CE 9B B1 2C 78 74
              :                      BC 8B 1C 60 B5 DB 8B 03 9E 49 F2 2B
              :                      7F 93 6E 3D 89 14 C9 E3 6B F4 F6 7D
              :                      76 AE 3E 58 1F 9B BB BC 7C 30 19 4E
              :                      10 F7 02 F1 8B 5B B4 DB 9A BB 93 B4
              :                      18 D0 CC 2B C9 91 A9 AD D9 46 F8 65
              :                      A9 E2 71 95 D0 D4 4E 1F CD 74 6F 82
              :                      E8 37 6F 5A 3D CB C7 D4 5F C2 80 1B
              :                      DA D3 84 40 68 5F 56 9A 62 F5 3B 0D
              :                      6C 33 C3 ED 67 3F 43 BF
              :                      }
              :                    }
              :                  }
              :                }
              :              }
              :            }
              :          }
              :        }
              :      }
```

```
              :   }
```

4.5. All RSA Signed Message

Same as 4.2, but includes Carl's RSA root cert (but no CRL). A SignedData with no attribute certificates, signed by Alice using RSA, her certificate and Carl's root cert, no CRL. The message is ExContent, and is included in the eContent. There are no signed or unsigned attributes.

```
   0 30 NDEF: SEQUENCE {
   2 06    9:   OBJECT IDENTIFIER signedData (1 2 840 113549 1 7 2)
              :     (PKCS #7)
  13 A0 NDEF:   [0] {
  15 30 NDEF:     SEQUENCE {
  17 02    1:       INTEGER 1
  20 31   11:       SET {
  22 30    9:         SEQUENCE {
  24 06    5:           OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
              :             (OIW)
  31 05    0:           NULL
              :           }
              :         }
  33 30 NDEF:       SEQUENCE {
  35 06    9:         OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
              :           (PKCS #7)
  46 A0 NDEF:         [0] {
  48 24 NDEF:           OCTET STRING {
  50 04    4:             OCTET STRING 'This'
  56 04   24:             OCTET STRING ' is some sample content.'
              :             }
              :           }
              :         }
  88 A0 NDEF:       [0] {
  90 30  491:         SEQUENCE {
  94 30  340:           SEQUENCE {
  98 A0    3:             [0] {
 100 02    1:               INTEGER 2
              :               }
 103 02   16:             INTEGER
              :               46 34 6B C7 80 00 56 BC 11 D3 6E 2E
              :               9F F2 50 20
 121 30   13:             SEQUENCE {
 123 06    9:               OBJECT IDENTIFIER
              :                 sha1withRSAEncryption
              :                     (1 2 840 113549 1 1 5)
              :               (PKCS #1)
 134 05    0:               NULL
```

```
                :             }
    136 30   18:           SEQUENCE {
    138 31   16:             SET {
    140 30   14:               SEQUENCE {
    142 06    3:                 OBJECT IDENTIFIER
                :                   commonName (2 5 4 3)
                :                   (X.520 id-at (2 5 4))
    147 13    7:                 PrintableString 'CarlRSA'
                :                 }
                :               }
                :             }
    156 30   30:           SEQUENCE {
    158 17   13:             UTCTime '990818070000Z'
    173 17   13:             UTCTime '991231235959Z'
                :             }
    188 30   18:           SEQUENCE {
    190 31   16:             SET {
    192 30   14:               SEQUENCE {
    194 06    3:                 OBJECT IDENTIFIER
                :                   commonName (2 5 4 3)
                :                   (X.520 id-at (2 5 4))
    199 13    7:                 PrintableString 'CarlRSA'
                :                 }
                :               }
                :             }
    208 30  159:           SEQUENCE {
    211 30   13:             SEQUENCE {
    213 06    9:               OBJECT IDENTIFIER
                :                 rsaEncryption (1 2 840 113549 1 1 1)
                :                 (PKCS #1)
    224 05    0:               NULL
                :               }
    226 03  141:             BIT STRING 0 unused bits, encapsulates {
    230 30  137:               SEQUENCE {
    233 02  129:                 INTEGER
                :                 00 E4 4B FF 18 B8 24 57 F4 77 FF 6E
                :                 73 7B 93 71 5C BC 33 1A 92 92 72 23
                :                 D8 41 46 D0 CD 11 3A 04 B3 8E AF 82
                :                 9D BD 51 1E 17 7A F2 76 2C 2B 86 39
                :                 A7 BD D7 8D 1A 53 EC E4 00 D5 E8 EC
                :                 A2 36 B1 ED E2 50 E2 32 09 8A 3F 9F
                :                 99 25 8F B8 4E AB B9 7D D5 96 65 DA
                :                 16 A0 C5 BE 0E AE 44 5B EF 5E F4 A7
                :                 29 CB 82 DD AC 44 E9 AA 93 94 29 0E
                :                 F8 18 D6 C8 57 5E F2 76 C4 F2 11 60
                :                 38 B9 1B 3C 1D 97 C9 6A F1
    365 02    3:                 INTEGER 65537
                :                 }
```

```
             :                 }
             :               }
  370 A3   66:             [3] {
  372 30   64:               SEQUENCE {
  374 30   15:                 SEQUENCE {
  376 06    3:                   OBJECT IDENTIFIER
             :                     basicConstraints (2 5 29 19)
             :                     (X.509 id-ce (2 5 29))
  381 01    1:                   BOOLEAN TRUE
  384 04    5:                   OCTET STRING, encapsulates {
  386 30    3:                       SEQUENCE {
  388 01    1:                         BOOLEAN TRUE
             :                         }
             :                       }
             :                   }
  391 30   14:                 SEQUENCE {
  393 06    3:                   OBJECT IDENTIFIER
             :                     keyUsage (2 5 29 15)
             :                     (X.509 id-ce (2 5 29))
  398 01    1:                   BOOLEAN TRUE
  401 04    4:                   OCTET STRING, encapsulates {
  403 03    2:                       BIT STRING 1 unused bits
             :                         '1100001'B
             :                       }
             :                   }
  407 30   29:                 SEQUENCE {
  409 06    3:                   OBJECT IDENTIFIER
             :                     subjectKeyIdentifier (2 5 29 14)
             :                     (X.509 id-ce (2 5 29))
  414 04   22:                   OCTET STRING, encapsulates {
  416 04   20:                       OCTET STRING
             :                     E9 E0 90 27 AC 78 20 7A 9A D3 4C F2
             :                     42 37 4E 22 AE 9E 38 BB
             :                       }
             :                   }
             :                 }
             :               }
  438 30   13:           SEQUENCE {
  440 06    9:             OBJECT IDENTIFIER
             :               sha1withRSAEncryption
             :                   (1 2 840 113549 1 1 5)
             :               (PKCS #1)
  451 05    0:             NULL
             :             }
  453 03  129:           BIT STRING 0 unused bits
             :             B7 9E D4 04 D3 ED 29 E4 FF 89 89 15
             :             2E 4C DB 0C F0 48 0F 32 61 EE C4 04
```

```
                :             EC 12 5D 2D FF 0F 64 59 7E 0A C3 ED
                :             18 FD E3 56 40 37 A7 07 B5 F0 38 12
                :             61 50 ED EF DD 3F E3 0B B8 61 A5 A4
                :             9B 3C E6 9E 9C 54 9A B6 95 D6 DA 6C
                :             3B B5 2D 45 35 9D 49 01 76 FA B9 B9
                :             31 F9 F9 6B 12 53 A0 F5 14 60 9B 7D
                :             CA 3E F2 53 6B B0 37 6F AD E6 74 D7
                :             DB FA 5A EA 14 41 63 5D CD BE C8 0E
                :             C1 DA 6A 8D 53 34 18 02
                :           }
    585 30  556:         SEQUENCE {
    589 30  405:           SEQUENCE {
    593 A0    3:             [0] {
    595 02    1:               INTEGER 2
                :               }
    598 02   16:             INTEGER
                :               46 34 6B C7 80 00 56 BC 11 D3 6E 2E
                :               C4 10 B3 B0
    616 30   13:             SEQUENCE {
    618 06    9:               OBJECT IDENTIFIER
                :                 sha1withRSAEncryption
                :                     (1 2 840 113549 1 1 5)
                :                 (PKCS #1)
    629 05    0:               NULL
                :               }
    631 30   18:             SEQUENCE {
    633 31   16:               SET {
    635 30   14:                 SEQUENCE {
    637 06    3:                   OBJECT IDENTIFIER
                :                     commonName (2 5 4 3)
                :                     (X.520 id-at (2 5 4))
    642 13    7:                   PrintableString 'CarlRSA'
                :                   }
                :                 }
                :               }
    651 30   30:             SEQUENCE {
    653 17   13:               UTCTime '990919010847Z'
    668 17   13:               UTCTime '391231235959Z'
                :               }
    683 30   19:             SEQUENCE {
    685 31   17:               SET {
    687 30   15:                 SEQUENCE {
    689 06    3:                   OBJECT IDENTIFIER
                :                     commonName (2 5 4 3)
                :                     (X.520 id-at (2 5 4))
    694 13    8:                   PrintableString 'AliceRSA'
                :                   }
                :                 }
```

```
             :             }
    704 30  159:           SEQUENCE {
    707 30   13:             SEQUENCE {
    709 06    9:               OBJECT IDENTIFIER
             :                   rsaEncryption (1 2 840 113549 1 1 1)
             :                   (PKCS #1)
    720 05    0:               NULL
             :               }
    722 03  141:             BIT STRING 0 unused bits, encapsulates {
    726 30  137:                 SEQUENCE {
    729 02  129:                   INTEGER
             :                   00 E0 89 73 39 8D D8 F5 F5 E8 87 76
             :                   39 7F 4E B0 05 BB 53 83 DE 0F B7 AB
             :                   DC 7D C7 75 29 0D 05 2E 6D 12 DF A6
             :                   86 26 D4 D2 6F AA 58 29 FC 97 EC FA
             :                   82 51 0F 30 80 BE B1 50 9E 46 44 F1
             :                   2C BB D8 32 CF C6 68 6F 07 D9 B0 60
             :                   AC BE EE 34 09 6A 13 F5 F7 05 05 93
             :                   DF 5E BA 35 56 D9 61 FF 19 7F C9 81
             :                   E6 F8 6C EA 87 40 70 EF AC 6D 2C 74
             :                   9F 2D FA 55 3A B9 99 77 02 A6 48 52
             :                   8C 4E F3 57 38 57 74 57 5F
    861 02    3:                   INTEGER 65537
             :                   }
             :                 }
             :             }
    866 A3  129:           [3] {
    869 30  127:             SEQUENCE {
    871 30   12:               SEQUENCE {
    873 06    3:                 OBJECT IDENTIFIER
             :                   basicConstraints (2 5 29 19)
             :                   (X.509 id-ce (2 5 29))
    878 01    1:                 BOOLEAN TRUE
    881 04    2:                 OCTET STRING, encapsulates {
    883 30    0:                   SEQUENCE {}
             :                   }
             :                 }
    885 30   14:               SEQUENCE {
    887 06    3:                 OBJECT IDENTIFIER
             :                   keyUsage (2 5 29 15)
             :                   (X.509 id-ce (2 5 29))
    892 01    1:                 BOOLEAN TRUE
    895 04    4:                 OCTET STRING, encapsulates {
    897 03    2:                   BIT STRING 6 unused bits
             :                     '11'B
             :                   }
             :                 }
    901 30   31:               SEQUENCE {
```

```
    903 06    3:                  OBJECT IDENTIFIER
                :                    authorityKeyIdentifier (2 5 29 35)
                :                    (X.509 id-ce (2 5 29))
    908 04   24:                  OCTET STRING, encapsulates {
    910 30   22:                      SEQUENCE {
    912 80   20:                        [0]
                :                    E9 E0 90 27 AC 78 20 7A 9A D3 4C F2
                :                    42 37 4E 22 AE 9E 38 BB
                :                        }
                :                    }
                :                  }
    934 30   29:                SEQUENCE {
    936 06    3:                  OBJECT IDENTIFIER
                :                    subjectKeyIdentifier (2 5 29 14)
                :                    (X.509 id-ce (2 5 29))
    941 04   22:                  OCTET STRING, encapsulates {
    943 04   20:                      OCTET STRING
                :                    77 D2 B4 D1 B7 4C 8A 8A A3 CE 45 9D
                :                    CE EC 3C A0 3A E3 FF 50
                :                      }
                :                  }
    965 30   31:                SEQUENCE {
    967 06    3:                  OBJECT IDENTIFIER
                :                    subjectAltName (2 5 29 17)
                :                    (X.509 id-ce (2 5 29))
    972 04   24:                  OCTET STRING, encapsulates {
    974 30   22:                      SEQUENCE {
    976 81   20:                        [1] 'AliceRSA@example.com'
                :                        }
                :                    }
                :                  }
                :                }
                :              }
                :            }
    998 30   13:          SEQUENCE {
   1000 06    9:            OBJECT IDENTIFIER
                :              sha1withRSAEncryption
                :                  (1 2 840 113549 1 1 5)
                :              (PKCS #1)
   1011 05    0:            NULL
                :            }
   1013 03  129:          BIT STRING 0 unused bits
                :            3E 70 47 A8 48 CC 13 58 8F CA 51 71
                :            6B 4E 36 18 5D 04 7E 80 B1 8D 4D CC
                :            CA A3 8F CC 7D 56 C8 BC CF 6E B3 1C
                :            59 A9 20 AA 05 81 A8 4E 25 AD A7 70
                :            14 75 2F F5 C7 9B D1 0E E9 63 D2 64
                :            B7 C6 66 6E 73 21 54 DF F4 BA 25 5D
```

```
                :             7D 49 D3 94 6B 22 36 74 73 B8 4A EC
                :             2F 64 ED D3 3D D2 A7 42 C5 E8 37 8A
                :             B4 DB 9F 67 E4 BD 9F F9 FE 74 EF EA
                :             F9 EE 63 6A D8 3F 4B 25 09 B5 D8 1A
                :             76 AE EB 9B DB 49 B0 22
                :           }
                :         }
   1147 31  203:       SET {
   1150 30  200:         SEQUENCE {
   1153 02    1:           INTEGER 1
   1156 30   38:           SEQUENCE {
   1158 30   18:             SEQUENCE {
   1160 31   16:               SET {
   1162 30   14:                 SEQUENCE {
   1164 06    3:                   OBJECT IDENTIFIER
                :                     commonName (2 5 4 3)
                :                     (X.520 id-at (2 5 4))
   1169 13    7:                   PrintableString 'CarlRSA'
                :                   }
                :                 }
                :               }
   1178 02   16:             INTEGER
                :               46 34 6B C7 80 00 56 BC 11 D3 6E 2E
                :               C4 10 B3 B0
                :             }
   1196 30    9:             SEQUENCE {
   1198 06    5:               OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
                :                 (OIW)
   1205 05    0:               NULL
                :               }
   1207 30   13:             SEQUENCE {
   1209 06    9:               OBJECT IDENTIFIER
                :                 rsaEncryption (1 2 840 113549 1 1 1)
                :                 (PKCS #1)
   1220 05    0:               NULL
                :               }
   1222 04  128:             OCTET STRING
                :               2F 23 82 D2 F3 09 5F B8 0C 58 EB 4E
                :               9D BF 89 9A 81 E5 75 C4 91 3D D3 D0
                :               D5 7B B6 D5 FE 94 A1 8A AC E3 C4 84
                :               F5 CD 60 4E 27 95 F6 CF 00 86 76 75
                :               3F 2B F0 E7 D4 02 67 A7 F5 C7 8D 16
                :               04 A5 B3 B5 E7 D9 32 F0 24 EF E7 20
                :               44 D5 9F 07 C5 53 24 FA CE 01 1D 0F
                :               17 13 A7 2A 95 9D 2B E4 03 95 14 0B
                :               E9 39 0D BA CE 6E 9C 9E 0C E8 98 E6
                :               55 13 D4 68 6F D0 07 D7 A2 B1 62 4C
                :               E3 8F AF FD E0 D5 5D C7
```

```
                :           }
                :         }
                :       }
                :     }
                :   }
```

4.6. Multiple Signers

Similar to 4.1, but the message is also signed by Diane. Two signerInfos (one for Alice, one for Diane) with no attribute certificates, each signed using DSS, Alice's and Diane's certificate (not Carl's root cert), no CRL. The message is ExContent, and is included in the eContent. There are no signed or unsigned attributes.

```
   0 30 1463: SEQUENCE {
   4 06    9:   OBJECT IDENTIFIER signedData (1 2 840 113549 1 7 2)
              :     (PKCS #7)
  15 A0 1448:   [0] {
  19 30 1444:     SEQUENCE {
  23 02    1:       INTEGER 1
  26 31    9:       SET {
  28 30    7:         SEQUENCE {
  30 06    5:           OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
              :             (OIW)
              :           }
              :         }
  37 30   43:       SEQUENCE {
  39 06    9:         OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
              :           (PKCS #7)
  50 A0   30:         [0] {
  52 04   28:           OCTET STRING 'This is some sample content.'
              :           }
              :         }
  82 A0 1180:       [0] {
  86 30  440:         SEQUENCE {
  90 30  375:           SEQUENCE {
  94 A0    3:             [0] {
  96 02    1:               INTEGER 2
              :               }
  99 02    2:             INTEGER 210
 103 30    9:             SEQUENCE {
 105 06    7:               OBJECT IDENTIFIER
              :                 dsaWithSha1 (1 2 840 10040 4 3)
              :                 (ANSI X9.57 algorithm)
              :               }
 114 30   18:             SEQUENCE {
 116 31   16:               SET {
```

```
    118 30   14:                SEQUENCE {
    120 06    3:                  OBJECT IDENTIFIER
                :                    commonName (2 5 4 3)
                :                    (X.520 id-at (2 5 4))
    125 13    7:                  PrintableString 'CarlDSS'
                :                  }
                :                }
                :              }
    134 30   30:              SEQUENCE {
    136 17   13:                UTCTime '990817020810Z'
    151 17   13:                UTCTime '3912312359592'
                :                }
    166 30   19:              SEQUENCE {
    168 31   17:                SET {
    170 30   15:                  SEQUENCE {
    172 06    3:                    OBJECT IDENTIFIER
                :                      commonName (2 5 4 3)
                :                      (X.520 id-at (2 5 4))
    177 13    8:                    PrintableString 'DianeDSS'
                :                  }
                :                }
                :              }
    187 30  147:              SEQUENCE {
    190 30    9:                SEQUENCE {
    192 06    7:                  OBJECT IDENTIFIER
                :                    dsa (1 2 840 10040 4 1)
                :                    (ANSI X9.57 algorithm)
                :                  }
    201 03  133:                BIT STRING 0 unused bits, encapsulates {
    205 02  129:                    INTEGER
                :                      00 A0 00 17 78 2C EE 7E 81 53 2E 2E
                :                      61 08 0F A1 9B 51 52 1A DA 59 A8 73
                :                      2F 12 25 B6 08 CB CA EF 2A 44 76 8A
                :                      52 09 EA BD 05 22 D5 0F F6 FD 46 D7
                :                      AF 99 38 09 0E 13 CB 4F 2C DD 1C 34
                :                      F7 1C BF 25 FF 23 D3 3B 59 E7 82 97
                :                      37 BE 31 24 D8 18 C8 F3 49 39 5B B7
                :                      E2 E5 27 7E FC 8C 45 72 5B 7E 3E 8F
                :                      68 4D DD 46 7A 22 BE 8E FF CC DA 39
                :                      29 A3 39 E5 9F 43 E9 55 C9 D7 5B A6
                :                      81 67 CC C0 AA CD 2E C5 23
                :                    }
                :                }
    337 A3  129:              [3] {
    340 30  127:                SEQUENCE {
    342 30   12:                  SEQUENCE {
    344 06    3:                    OBJECT IDENTIFIER
                :                      basicConstraints (2 5 29 19)
```

```
             :                   (X.509 id-ce (2 5 29))
    349 01    1:                 BOOLEAN TRUE
    352 04    2:                 OCTET STRING, encapsulates {
    354 30    0:                     SEQUENCE {}
             :                       }
             :                 }
    356 30   14:               SEQUENCE {
    358 06    3:                 OBJECT IDENTIFIER
             :                   keyUsage (2 5 29 15)
             :                   (X.509 id-ce (2 5 29))
    363 01    1:                 BOOLEAN TRUE
    366 04    4:                 OCTET STRING, encapsulates {
    368 03    2:                     BIT STRING 6 unused bits
             :                       '11'B
             :                   }
             :                 }
    372 30   31:               SEQUENCE {
    374 06    3:                 OBJECT IDENTIFIER
             :                   authorityKeyIdentifier (2 5 29 35)
             :                   (X.509 id-ce (2 5 29))
    379 04   24:                 OCTET STRING, encapsulates {
    381 30   22:                     SEQUENCE {
    383 80   20:                       [0]
             :                   70 44 3E 82 2E 6F 87 DE 4A D3 75 E3
             :                   3D 20 BC 43 2B 93 F1 1F
             :                       }
             :                   }
             :                 }
    405 30   29:               SEQUENCE {
    407 06    3:                 OBJECT IDENTIFIER
             :                   subjectKeyIdentifier (2 5 29 14)
             :                   (X.509 id-ce (2 5 29))
    412 04   22:                 OCTET STRING, encapsulates {
    414 04   20:                     OCTET STRING
             :                   64 30 99 7D 5C DC 45 0B 99 3A 52 2F
             :                   16 BF 58 50 DD CE 2B 18
             :                   }
             :                 }
    436 30   31:               SEQUENCE {
    438 06    3:                 OBJECT IDENTIFIER
             :                   subjectAltName (2 5 29 17)
             :                   (X.509 id-ce (2 5 29))
    443 04   24:                 OCTET STRING, encapsulates {
    445 30   22:                     SEQUENCE {
    447 81   20:                       [1] 'DianeDSS@example.com'
             :                       }
             :                   }
             :                 }
```

```
                :                 }
                :               }
                :             }
    469 30    9:             SEQUENCE {
    471 06    7:               OBJECT IDENTIFIER
                :                 dsaWithSha1 (1 2 840 10040 4 3)
                :                 (ANSI X9.57 algorithm)
                :               }
    480 03   48:             BIT STRING 0 unused bits, encapsulates {
    483 30   45:                 SEQUENCE {
    485 02   21:                   INTEGER
                :                     00 A1 1A F8 17 0E 3E 5D A8 8C F4 B6
                :                     55 33 1E 4B E3 2C AC B9 5F
    508 02   20:                   INTEGER
                :                     28 4B 10 45 58 D2 1C 9D 55 35 14 18
                :                     91 B2 3F 39 DF B5 6E D3
                :                   }
                :                 }
                :             }
    530 30  732:           SEQUENCE {
    534 30  667:             SEQUENCE {
    538 A0    3:               [0] {
    540 02    1:                 INTEGER 2
                :                 }
    543 02    2:               INTEGER 200
    547 30    9:               SEQUENCE {
    549 06    7:                 OBJECT IDENTIFIER
                :                   dsaWithSha1 (1 2 840 10040 4 3)
                :                   (ANSI X9.57 algorithm)
                :                 }
    558 30   18:               SEQUENCE {
    560 31   16:                 SET {
    562 30   14:                   SEQUENCE {
    564 06    3:                     OBJECT IDENTIFIER
                :                       commonName (2 5 4 3)
                :                       (X.520 id-at (2 5 4))
    569 13    7:                     PrintableString 'CarlDSS'
                :                     }
                :                   }
                :                 }
    578 30   30:               SEQUENCE {
    580 17   13:                 UTCTime '990817011049Z'
    595 17   13:                 UTCTime '3912312359592'
                :                 }
    610 30   19:               SEQUENCE {
    612 31   17:                 SET {
    614 30   15:                   SEQUENCE {
    616 06    3:                     OBJECT IDENTIFIER
```

```
                :                   commonName (2 5 4 3)
                :                   (X.520 id-at (2 5 4))
    621 13    8:                 PrintableString 'AliceDSS'
                :                 }
                :               }
                :             }
    631 30  438:             SEQUENCE {
    635 30  299:               SEQUENCE {
    639 06    7:                 OBJECT IDENTIFIER
                :                   dsa (1 2 840 10040 4 1)
                :                   (ANSI X9.57 algorithm)
    648 30  286:                 SEQUENCE {
    652 02  129:                   INTEGER
                :                   00 81 8D CD ED 83 EA 0A 9E 39 3E C2
                :                   48 28 A3 E4 47 93 DD 0E D7 A8 0E EC
                :                   53 C5 AB 84 08 4F FF 94 E1 73 48 7E
                :                   0C D6 F3 44 48 D1 FE 9F AF A4 A1 89
                :                   2F E1 D9 30 C8 36 DE 3F 9B BF B7 4C
                :                   DC 5F 69 8A E4 75 D0 37 0C 91 08 95
                :                   9B DE A7 5E F9 FC F4 9F 2F DD 43 A8
                :                   8B 54 F1 3F B0 07 08 47 4D 5D 88 C3
                :                   C3 B5 B3 E3 55 08 75 D5 39 76 10 C4
                :                   78 BD FF 9D B0 84 97 37 F2 E4 51 1B
                :                   B5 E4 09 96 5C F3 7E 5B DB
    784 02   21:                   INTEGER
                :                   00 E2 47 A6 1A 45 66 B8 13 C6 DA 8F
                :                   B8 37 21 2B 62 8B F7 93 CD
    807 02  128:                   INTEGER
                :                   26 38 D0 14 89 32 AA 39 FB 3E 6D D9
                :                   4B 59 6A 4C 76 23 39 04 02 35 5C F2
                :                   CB 1A 30 C3 1E 50 5D DD 9B 59 E2 CD
                :                   AA 05 3D 58 C0 7B A2 36 B8 6E 07 AF
                :                   7D 8A 42 25 A7 F4 75 CF 4A 08 5E 4B
                :                   3E 90 F8 6D EA 9C C9 21 8A 3B 76 14
                :                   E9 CE 2E 5D A3 07 CD 23 85 B8 2F 30
                :                   01 7C 6D 49 89 11 89 36 44 BD F8 C8
                :                   95 4A 53 56 B5 E2 F9 73 EC 1A 61 36
                :                   1F 11 7F C2 BD ED D1 50 FF 98 74 C2
                :                   D1 81 4A 60 39 BA 36 39
                :                   }
                :                 }
    938 03  132:                 BIT STRING 0 unused bits, encapsulates {
    942 02  128:                     INTEGER
                :                     5C E3 B9 5A 75 14 96 0B A9 7A DD E3
                :                     3F A9 EC AC 5E DC BD B7 13 11 34 A6
                :                     16 89 28 11 23 D9 34 86 67 75 75 13
                :                     12 3D 43 5B 6F E5 51 BF FA 89 F2 A2
                :                     1B 3E 24 7D 3D 07 8D 5B 63 C8 BB 45
```

```
              :                   A5 A0 4A E3 85 D6 CE 06 80 3F E8 23
              :                   7E 1A F2 24 AB 53 1A B8 27 0D 1E EF
              :                   08 BF 66 14 80 5C 62 AC 65 FA 15 8B
              :                   F1 BB 34 D4 D2 96 37 F6 61 47 B2 C4
              :                   32 84 F0 7E 41 40 FD 46 A7 63 4E 33
              :                   F2 A5 E2 F4 F2 83 E5 B8
              :                   }
              :               }
   1073 A3  129:              [3] {
   1076 30  127:                SEQUENCE {
   1078 30   12:                  SEQUENCE {
   1080 06    3:                    OBJECT IDENTIFIER
              :                      basicConstraints (2 5 29 19)
              :                      (X.509 id-ce (2 5 29))
   1085 01    1:                    BOOLEAN TRUE
   1088 04    2:                    OCTET STRING, encapsulates {
   1090 30    0:                      SEQUENCE {}
              :                      }
              :                    }
   1092 30   14:                  SEQUENCE {
   1094 06    3:                    OBJECT IDENTIFIER
              :                      keyUsage (2 5 29 15)
              :                      (X.509 id-ce (2 5 29))
   1099 01    1:                    BOOLEAN TRUE
   1102 04    4:                    OCTET STRING, encapsulates {
   1104 03    2:                      BIT STRING 6 unused bits
              :                        '11'B
              :                      }
              :                    }
   1108 30   31:                  SEQUENCE {
   1110 06    3:                    OBJECT IDENTIFIER
              :                      authorityKeyIdentifier (2 5 29 35)
              :                      (X.509 id-ce (2 5 29))
   1115 04   24:                    OCTET STRING, encapsulates {
   1117 30   22:                      SEQUENCE {
   1119 80   20:                        [0]
              :                      70 44 3E 82 2E 6F 87 DE 4A D3 75 E3
              :                      3D 20 BC 43 2B 93 F1 1F
              :                        }
              :                      }
              :                    }
   1141 30   29:                  SEQUENCE {
   1143 06    3:                    OBJECT IDENTIFIER
              :                      subjectKeyIdentifier (2 5 29 14)
              :                      (X.509 id-ce (2 5 29))
   1148 04   22:                    OCTET STRING, encapsulates {
   1150 04   20:                      OCTET STRING
              :                    BE 6C A1 B3 E3 C1 F7 ED 43 70 A4 CE
```

```
                :                   13 01 E2 FD E3 97 FE CD
                :                       }
                :                   }
   1172 30   31:                 SEQUENCE {
   1174 06    3:                   OBJECT IDENTIFIER
                :                     subjectAltName (2 5 29 17)
                :                     (X.509 id-ce (2 5 29))
   1179 04   24:                   OCTET STRING, encapsulates {
   1181 30   22:                     SEQUENCE {
   1183 81   20:                       [1] 'AliceDSS@example.com'
                :                       }
                :                     }
                :                   }
                :                 }
                :               }
                :             }
   1205 30    9:           SEQUENCE {
   1207 06    7:             OBJECT IDENTIFIER
                :               dsaWithSha1 (1 2 840 10040 4 3)
                :               (ANSI X9.57 algorithm)
                :             }
   1216 03   48:           BIT STRING 0 unused bits, encapsulates {
   1219 30   45:             SEQUENCE {
   1221 02   20:               INTEGER
                :                 55 0C A4 19 1F 42 2B 89 71 22 33 8D
                :                 83 6A B5 3D 67 6B BF 45
   1243 02   21:               INTEGER
                :                 00 9F 61 53 52 54 0B 5C B2 DD DA E7
                :                 76 1D E2 10 52 5B 43 5E BD
                :               }
                :             }
                :           }
                :         }
   1266 31  198:       SET {
   1269 30   97:         SEQUENCE {
   1271 02    1:           INTEGER 1
   1274 30   24:           SEQUENCE {
   1276 30   18:             SEQUENCE {
   1278 31   16:               SET {
   1280 30   14:                 SEQUENCE {
   1282 06    3:                   OBJECT IDENTIFIER
                :                     commonName (2 5 4 3)
                :                     (X.520 id-at (2 5 4))
   1287 13    7:                   PrintableString 'CarlDSS'
                :                   }
                :                 }
                :               }
   1296 02    2:             INTEGER 200
```

```
                :             }
   1300 30    7:           SEQUENCE {
   1302 06    5:             OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
                :               (OIW)
                :             }
   1309 30    9:           SEQUENCE {
   1311 06    7:             OBJECT IDENTIFIER
                :               dsaWithSha1 (1 2 840 10040 4 3)
                :               (ANSI X9.57 algorithm)
                :             }
   1320 04   46:           OCTET STRING, encapsulates {
   1322 30   44:               SEQUENCE {
   1324 02   20:                 INTEGER
                :                   48 24 DE 8B 85 F2 16 AF EC 82 61 A9
                :                   54 D0 2D 04 A1 CC 5A 4F
   1346 02   20:                 INTEGER
                :                   17 ED D5 77 02 EE 75 13 D8 10 BD 3D
                :                   97 17 20 88 BB FD 7B 81
                :                 }
                :               }
                :           }
   1368 30   97:         SEQUENCE {
   1370 02    1:           INTEGER 1
   1373 30   24:           SEQUENCE {
   1375 30   18:             SEQUENCE {
   1377 31   16:               SET {
   1379 30   14:                 SEQUENCE {
   1381 06    3:                   OBJECT IDENTIFIER
                :                     commonName (2 5 4 3)
                :                     (X.520 id-at (2 5 4))
   1386 13    7:                   PrintableString 'CarlDSS'
                :                   }
                :                 }
                :               }
   1395 02    2:             INTEGER 210
                :             }
   1399 30    7:           SEQUENCE {
   1401 06    5:             OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
                :               (OIW)
                :             }
   1408 30    9:           SEQUENCE {
   1410 06    7:             OBJECT IDENTIFIER
                :               dsaWithSha1 (1 2 840 10040 4 3)
                :               (ANSI X9.57 algorithm)
                :             }
   1419 04   46:           OCTET STRING, encapsulates {
   1421 30   44:               SEQUENCE {
   1423 02   20:                 INTEGER
```

```
              :                   15 FF 81 4D 8C AD 80 4E 9B 35 58 04
              :                   37 6E 63 6E E9 5B 83 FA
   1445 02   20:                 INTEGER
              :                   06 7E 58 4E 2B 31 84 41 ED 49 79 38
              :                   3E 77 D2 A6 8C 75 08 21
              :                 }
              :               }
              :             }
              :           }
              :         }
              :       }
              :     }
              :   }
```

4.7. Signing Using SKI

Same as 4.1, but the signature uses the SKI instead of the issuer/serial number in the cert. A SignedData with no attribute certificates, signed by Alice using DSS, just her certificate (not Carl's root cert), identified by the SKI, no CRL. The message is ExContent, and is included in the eContent. There are no signed or unsigned attributes.

```
    0 30  915: SEQUENCE {
    4 06    9:   OBJECT IDENTIFIER signedData (1 2 840 113549 1 7 2)
              :     (PKCS #7)
   15 A0  900:   [0] {
   19 30  896:     SEQUENCE {
   23 02    1:       INTEGER 3
   26 31    9:       SET {
   28 30    7:         SEQUENCE {
   30 06    5:           OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
              :             (OIW)
              :           }
              :         }
   37 30   43:       SEQUENCE {
   39 06    9:         OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
              :           (PKCS #7)
   50 A0   30:         [0] {
   52 04   28:           OCTET STRING 'This is some sample content.'
              :           }
              :         }
   82 A0  736:       [0] {
   86 30  732:         SEQUENCE {
   90 30  667:           SEQUENCE {
   94 A0    3:             [0] {
   96 02    1:               INTEGER 2
              :               }
   99 02    2:             INTEGER 200
```

```
    103 30    9:             SEQUENCE {
    105 06    7:               OBJECT IDENTIFIER
                :                 dsaWithSha1 (1 2 840 10040 4 3)
                :                 (ANSI X9.57 algorithm)
                :               }
    114 30   18:             SEQUENCE {
    116 31   16:               SET {
    118 30   14:                 SEQUENCE {
    120 06    3:                   OBJECT IDENTIFIER
                :                     commonName (2 5 4 3)
                :                     (X.520 id-at (2 5 4))
    125 13    7:                   PrintableString 'CarlDSS'
                :                   }
                :                 }
                :               }
    134 30   30:             SEQUENCE {
    136 17   13:               UTCTime '990817011049Z'
    151 17   13:               UTCTime '3912312359592'
                :               }
    166 30   19:             SEQUENCE {
    168 31   17:               SET {
    170 30   15:                 SEQUENCE {
    172 06    3:                   OBJECT IDENTIFIER
                :                     commonName (2 5 4 3)
                :                     (X.520 id-at (2 5 4))
    177 13    8:                   PrintableString 'AliceDSS'
                :                   }
                :                 }
                :               }
    187 30  438:             SEQUENCE {
    191 30  299:               SEQUENCE {
    195 06    7:                 OBJECT IDENTIFIER
                :                   dsa (1 2 840 10040 4 1)
                :                   (ANSI X9.57 algorithm)
    204 30  286:                 SEQUENCE {
    208 02  129:                   INTEGER
                :                   00 81 8D CD ED 83 EA 0A 9E 39 3E C2
                :                   48 28 A3 E4 47 93 DD 0E D7 A8 0E EC
                :                   53 C5 AB 84 08 4F FF 94 E1 73 48 7E
                :                   0C D6 F3 44 48 D1 FE 9F AF A4 A1 89
                :                   2F E1 D9 30 C8 36 DE 3F 9B BF B7 4C
                :                   DC 5F 69 8A E4 75 D0 37 0C 91 08 95
                :                   9B DE A7 5E F9 FC F4 9F 2F DD 43 A8
                :                   8B 54 F1 3F B0 07 08 47 4D 5D 88 C3
                :                   C3 B5 B3 E3 55 08 75 D5 39 76 10 C4
                :                   78 BD FF 9D B0 84 97 37 F2 E4 51 1B
                :                   B5 E4 09 96 5C F3 7E 5B DB
    340 02   21:                   INTEGER
```

```
              :                   00 E2 47 A6 1A 45 66 B8 13 C6 DA 8F
              :                   B8 37 21 2B 62 8B F7 93 CD
    363 02  128:                  INTEGER
              :                   26 38 D0 14 89 32 AA 39 FB 3E 6D D9
              :                   4B 59 6A 4C 76 23 39 04 02 35 5C F2
              :                   CB 1A 30 C3 1E 50 5D DD 9B 59 E2 CD
              :                   AA 05 3D 58 C0 7B A2 36 B8 6E 07 AF
              :                   7D 8A 42 25 A7 F4 75 CF 4A 08 5E 4B
              :                   3E 90 F8 6D EA 9C C9 21 8A 3B 76 14
              :                   E9 CE 2E 5D A3 07 CD 23 85 B8 2F 30
              :                   01 7C 6D 49 89 11 89 36 44 BD F8 C8
              :                   95 4A 53 56 B5 E2 F9 73 EC 1A 61 36
              :                   1F 11 7F C2 BD ED D1 50 FF 98 74 C2
              :                   D1 81 4A 60 39 BA 36 39
              :                   }
              :                 }
    494 03  132:                BIT STRING 0 unused bits, encapsulates {
    498 02  128:                  INTEGER
              :                   5C E3 B9 5A 75 14 96 0B A9 7A DD E3
              :                   3F A9 EC AC 5E DC BD B7 13 11 34 A6
              :                   16 89 28 11 23 D9 34 86 67 75 75 13
              :                   12 3D 43 5B 6F E5 51 BF FA 89 F2 A2
              :                   1B 3E 24 7D 3D 07 8D 5B 63 C8 BB 45
              :                   A5 A0 4A E3 85 D6 CE 06 80 3F E8 23
              :                   7E 1A F2 24 AB 53 1A B8 27 0D 1E EF
              :                   08 BF 66 14 80 5C 62 AC 65 FA 15 8B
              :                   F1 BB 34 D4 D2 96 37 F6 61 47 B2 C4
              :                   32 84 F0 7E 41 40 FD 46 A7 63 4E 33
              :                   F2 A5 E2 F4 F2 83 E5 B8
              :                   }
              :                 }
    629 A3  129:               [3] {
    632 30  127:                 SEQUENCE {
    634 30   12:                   SEQUENCE {
    636 06    3:                     OBJECT IDENTIFIER
              :                       basicConstraints (2 5 29 19)
              :                       (X.509 id-ce (2 5 29))
    641 01    1:                     BOOLEAN TRUE
    644 04    2:                     OCTET STRING, encapsulates {
    646 30    0:                       SEQUENCE {}
              :                       }
              :                     }
    648 30   14:                   SEQUENCE {
    650 06    3:                     OBJECT IDENTIFIER
              :                       keyUsage (2 5 29 15)
              :                       (X.509 id-ce (2 5 29))
    655 01    1:                     BOOLEAN TRUE
    658 04    4:                     OCTET STRING, encapsulates {
```

```
    660 03    2:                      BIT STRING 6 unused bits
                :                        '11'B
                :                      }
                :                    }
    664 30   31:                  SEQUENCE {
    666 06    3:                    OBJECT IDENTIFIER
                :                      authorityKeyIdentifier (2 5 29 35)
                :                      (X.509 id-ce (2 5 29))
    671 04   24:                    OCTET STRING, encapsulates {
    673 30   22:                      SEQUENCE {
    675 80   20:                        [0]
                :                    70 44 3E 82 2E 6F 87 DE 4A D3 75 E3
                :                    3D 20 BC 43 2B 93 F1 1F
                :                        }
                :                      }
                :                    }
    697 30   29:                  SEQUENCE {
    699 06    3:                    OBJECT IDENTIFIER
                :                      subjectKeyIdentifier (2 5 29 14)
                :                      (X.509 id-ce (2 5 29))
    704 04   22:                    OCTET STRING, encapsulates {
    706 04   20:                      OCTET STRING
                :                    BE 6C A1 B3 E3 C1 F7 ED 43 70 A4 CE
                :                    13 01 E2 FD E3 97 FE CD
                :                      }
                :                    }
    728 30   31:                  SEQUENCE {
    730 06    3:                    OBJECT IDENTIFIER
                :                      subjectAltName (2 5 29 17)
                :                      (X.509 id-ce (2 5 29))
    735 04   24:                    OCTET STRING, encapsulates {
    737 30   22:                      SEQUENCE {
    739 81   20:                        [1] 'AliceDSS@example.com'
                :                      }
                :                    }
                :                  }
                :                }
                :              }
                :            }
    761 30    9:          SEQUENCE {
    763 06    7:            OBJECT IDENTIFIER
                :              dsaWithSha1 (1 2 840 10040 4 3)
                :              (ANSI X9.57 algorithm)
                :            }
    772 03   48:          BIT STRING 0 unused bits, encapsulates {
    775 30   45:            SEQUENCE {
    777 02   20:              INTEGER
                :                55 0C A4 19 1F 42 2B 89 71 22 33 8D
```

```
                :                   83 6A B5 3D 67 6B BF 45
    799 02   21:                 INTEGER
                :                   00 9F 61 53 52 54 0B 5C B2 DD DA E7
                :                   76 1D E2 10 52 5B 43 5E BD
                :                 }
                :               }
                :             }
                :           }
    822 31   95:         SET {
    824 30   93:           SEQUENCE {
    826 02    1:             INTEGER 3
    829 80   20:             [0]
                :               BE 6C A1 B3 E3 C1 F7 ED 43 70 A4 CE
                :               13 01 E2 FD E3 97 FE CD
    851 30    7:             SEQUENCE {
    853 06    5:               OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
                :                 (OIW)
                :               }
    860 30    9:             SEQUENCE {
    862 06    7:               OBJECT IDENTIFIER dsa (1 2 840 10040 4 1)
                :                 (ANSI X9.57 algorithm)
                :               }
    871 04   46:             OCTET STRING, encapsulates {
    873 30   44:                 SEQUENCE {
    875 02   20:                   INTEGER
                :                     6D 8E 5A CD 28 A0 1F D9 86 AD 7A E9
                :                     DF AC D7 BE EC BE 3F F8
    897 02   20:                   INTEGER
                :                     7C 8A 06 1E FC A4 41 35 7E F7 24 14
                :                     FD 3D C0 56 B7 05 27 D5
                :                   }
                :                 }
                :               }
                :             }
                :           }
                :         }
                :       }
                :     }
                :   }
```

4.8. S/MIME multipart/signed Message

A full S/MIME message, including MIME, that includes the body part from 4.3 and the body containing the content of the message.

```
MIME-Version: 1.0
To: User2@examples.com
From: aliceDss@examples.com
Subject: Example 4.8
Message-Id: <020906002550300.249@examples.com>
```

```
Date: Fri, 06 Sep 2002 00:25:21 -0300
Content-Type: multipart/signed;
    micalg=SHA1;
    boundary="----=_NextBoundry____Fri,_06_Sep_2002_00:25:21";
    protocol="application/pkcs7-signature"

This is a multi-part message in MIME format.

------=_NextBoundry____Fri,_06_Sep_2002_00:25:21

This is some sample content.
------=_NextBoundry____Fri,_06_Sep_2002_00:25:21
Content-Type: application/pkcs7-signature; name=smime.p7s
Content-Transfer-Encoding: base64
Content-Disposition: attachment; filename=smime.p7s

MIIDdwYJKoZIhvcNAQcCoIIDaDCCA2QCAQExCTAHBgUrDgMCGjALBgkqhkiG9w0BBwGgggL
gMIIC3DCCApugAwIBAgICAMgwCQYHKoZIzjgEAzASMRAwDgYDVQQDEwdDYXJsRFNTMB4XDT
k5MDgxNzAxMTA0OVoXDTM5MTIzMTIzNTk1OVowEzERMA8GA1UEAxMIQWxpY2VEU1MwggG2M
IIBKwYHKoZIzjgEATCCAR4CgYEAgY3N7YPqCp45PsJIKKPkR5PdDteoDuxTxauECE//lOFz
SH4M1vNESNH+n6+koYkv4dkwyDbeP5u/t0zcX2mK5HXQNwyRCJWb3qde+fz0ny/dQ6iLVPE
/sAcIR01diMPDtbPjVQh11Tl2EMR4vf+dsISXN/LkURu15AmWXPN+W9sCFQDiR6YaRWa4E8
baj7g3IStii/eTzQKBgCY40BSJMqo5+z5t2UtZakx2IzkEAjVc8ssaMMMeUF3dm1nizaoFP
VjAe6I2uG4Hr32KQiWn9HXPSgheSz6Q+G3qnMkhijt2FOnOLl2jB80jhbgvMAF8bUmJEYk2
RL34yJVKU1a14vlz7BphNh8Rf8K97dFQ/5h0wtGBSmA5ujY5A4GEAAKBgFzjuVp1FJYLqXr
d4z+p7Kxe3L23ExE0phaJKBEj2TSGZ3V1ExI9Q1tv5VG/+onyohs+JH09B41bY8i7RaWgSu
OF1s4GgD/oI34a8iSrUxq4Jw0e7wi/ZhSAXGKsZfoVi/G7NNTSljf2YUeyxDKE8H5BQP1Gp
2NOM/Kl4vTyg+W4o4GBMH8wDAYDVR0TAQH/BAIwADAOBgNVHQ8BAf8EBAMCBsAwHwYDVR0j
BBgwFoAUcEQ+gi5vh95K03XjPSC8QyuT8R8wHQYDVR0OBBYEFL5sobPjwfftQ3CkzhMB4v3
jl/7NMB8GA1UdEQQYMBaBFEFsaWNlRFNTQGV4YW1wbGUuY29tMAkGByqGSM44BAMDMAAwLQ
IUVQykGR9CK4lxIjONg2q1PWdrv0UCFQCfYVNSVAtcst3a53Yd4hBSW0NevTFjMGECAQEwG
DASMRAwDgYDVQQDEwdDYXJsRFNTAgIAyDAHBgUrDgMCGjAJBgcqhkjOOAQDBC4wLAIUM/mG
f6gkgp9Z0XtRdGimJeB/BxUCFGFFJqwYRt1WYcIOQoGiaowqGzVI

------=_NextBoundry____Fri,_06_Sep_2002_00:25:21--
```

4.9. S/MIME application/pkcs7-mime Signed Message

A full S/MIME message, including the MIME parts.

```
MIME-Version: 1.0
To: User2@examples.com
From: aliceDss@examples.com
Subject: Example 4.9
Message-Id: <021031164540300.304@examples.com>
Date: Thu, 31 Oct 2002 16:45:14 -0300
Content-Type: application/pkcs7-mime; smime-type=signed-data;
    name=smime.p7m
```

```
Content-Transfer-Encoding: base64
Content-Disposition: attachment; filename=smime.p7m

MIIDmQYJKoZIhvcNAQcCoIIDijCCA4YCAQExCTAHBgUrDgMCGjAtBgkqhkiG9w0BBwGgIAQ
eDQpUaGlzIGlzIHNvbWUgc2FtcGxlIGNvbnRlbnQuoIIC4DCCAtwwggKboAMCAQICAgDIMA
kGByqGSM44BAMwEjEQMA4GA1UEAxMHQ2FybERTUzAeFw05OTA4MTcwMTEwNDlaFw0zOTEyM
zEyMzU5NTlaMBMxETAPBgNVBAMTCEFsaWNlRFNTMIIBtjCCASsGByqGSM44BAEwggEeAoGB
AIGNze2D6gqeOT7CSCij5EeT3Q7XqA7sU8WrhAhP/5Thc0h+DNbzREjR/p+vpKGJL+HZMMg
23j+bv7dM3F9piuR10DcMkQiVm96nXvn89J8v3UOoi1TxP7AHCEdNXYjDw7Wz41UIddU5dh
DEeL3/nbCElzfy5FEbteQJllzzflvbAhUA4kemGkVmuBPG2o+4NyErYov3k80CgYAmONAUi
TKqOfs+bdlLWWpMdiM5BAI1XPLLGjDDHlBd3ZtZ4s2qBT1YwHuiNrhuB699ikIlp/R1z0oI
Xks+kPht6pzJIYo7dhTpzi5dowfNI4W4LzABfG1JiRGJNkS9+MiVSlNWteL5c+waYTYfEX/
Cve3RUP+YdMLRgUpgObo2OQOBhAACgYBc47ladRSWC6l63eM/qeysXty9txMRNKYWiSgRI9
k0hmd1dRMSPUNbb+VRv/qJ8qIbPiR9PQeNW2PIu0WloErjhdbOBoA/6CN+GvIkq1MauCcNH
u8Iv2YUgFxirGX6FYvxuzTU0pY39mFHssQyhPB+QUD9RqdjTjPypeL08oPluKOBgTB/MAwG
A1UdEwEB/wQCMAAwDgYDVR0PAQH/BAQDAgbAMB8GA1UdIwQYMBaAFHBEPoIub4feStN14z0
gvEMrk/EfMB0GA1UdDgQWBBS+bKGz48H37UNwpM4TAeL945f+zTAfBgNVHREEGDAWgRRBbG
ljZURTU0BleGFtcGxlLmNvbTAJBgcqhkjOOAQDAzAAMC0CFFUMpBkfQiuJcSIzjYNqtT1na
79FAhUAn2FTUlQLXLLd2ud2HeIQUltDXr0xYzBhAgEBMBgwEjEQMA4GA1UEAxMHQ2FybERT
UwICAMgwBwYFKw4DAhowCQYHKoZIzjgEAwQuMCwCFD1cSW6LIUFzeXle3YI5SKSBer/sAhQ
mCq7s/CTFHOEjgASeUjbMpx5g6A==
```

4.10. SignedData with Attributes

A SignedData message with the following list of signedAttributes:

- unknown OID
- contentHints
- smimeCapablilties
- securityLabel
- ContentReference
- smimeEncryptKeyPreference
- mlExpansionHistory
- EquivalentLabel

```
 0 30 2047: SEQUENCE {
 4 06    9:   OBJECT IDENTIFIER signedData (1 2 840 113549 1 7 2)
           :     (PKCS #7)
15 A0 2032:   [0] {
19 30 2028:     SEQUENCE {
23 02    1:       INTEGER 1
26 31    9:       SET {
28 30    7:         SEQUENCE {
30 06    5:           OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
           :             (OIW)
           :           }
           :         }
37 30   43:       SEQUENCE {
```

```
  39 06    9:         OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
              :           (PKCS #7)
  50 A0   30:         [0] {
  52 04   28:           OCTET STRING 'This is some sample content.'
              :           }
              :         }
  82 A0  736:       [0] {
  86 30  732:         SEQUENCE {
  90 30  667:           SEQUENCE {
  94 A0    3:             [0] {
  96 02    1:               INTEGER 2
              :               }
  99 02    2:             INTEGER 200
 103 30    9:             SEQUENCE {
 105 06    7:               OBJECT IDENTIFIER
              :                 dsaWithSha1 (1 2 840 10040 4 3)
              :                 (ANSI X9.57 algorithm)
              :               }
 114 30   18:             SEQUENCE {
 116 31   16:               SET {
 118 30   14:                 SEQUENCE {
 120 06    3:                   OBJECT IDENTIFIER
              :                     commonName (2 5 4 3)
              :                     (X.520 id-at (2 5 4))
 125 13    7:                   PrintableString 'CarlDSS'
              :                   }
              :                 }
              :               }
 134 30   30:             SEQUENCE {
 136 17   13:               UTCTime '990817011049Z'
 151 17   13:               UTCTime '391231235959Z'
              :               }
 166 30   19:             SEQUENCE {
 168 31   17:               SET {
 170 30   15:                 SEQUENCE {
 172 06    3:                   OBJECT IDENTIFIER
              :                     commonName (2 5 4 3)
              :                     (X.520 id-at (2 5 4))
 177 13    8:                   PrintableString 'AliceDSS'
              :                   }
              :                 }
              :               }
 187 30  438:             SEQUENCE {
 191 30  299:               SEQUENCE {
 195 06    7:                 OBJECT IDENTIFIER
              :                   dsa (1 2 840 10040 4 1)
              :                   (ANSI X9.57 algorithm)
 204 30  286:                 SEQUENCE {
```

```
 208 02  129:                   INTEGER
             :                   00 81 8D CD ED 83 EA 0A 9E 39 3E C2
             :                   48 28 A3 E4 47 93 DD 0E D7 A8 0E EC
             :                   53 C5 AB 84 08 4F FF 94 E1 73 48 7E
             :                   0C D6 F3 44 48 D1 FE 9F AF A4 A1 89
             :                   2F E1 D9 30 C8 36 DE 3F 9B BF B7 4C
             :                   DC 5F 69 8A E4 75 D0 37 0C 91 08 95
             :                   9B DE A7 5E F9 FC F4 9F 2F DD 43 A8
             :                   8B 54 F1 3F B0 07 08 47 4D 5D 88 C3
             :                   C3 B5 B3 E3 55 08 75 D5 39 76 10 C4
             :                   78 BD FF 9D B0 84 97 37 F2 E4 51 1B
             :                   B5 E4 09 96 5C F3 7E 5B DB
 340 02   21:                   INTEGER
             :                   00 E2 47 A6 1A 45 66 B8 13 C6 DA 8F
             :                   B8 37 21 2B 62 8B F7 93 CD
 363 02  128:                   INTEGER
             :                   26 38 D0 14 89 32 AA 39 FB 3E 6D D9
             :                   4B 59 6A 4C 76 23 39 04 02 35 5C F2
             :                   CB 1A 30 C3 1E 50 5D DD 9B 59 E2 CD
             :                   AA 05 3D 58 C0 7B A2 36 B8 6E 07 AF
             :                   7D 8A 42 25 A7 F4 75 CF 4A 08 5E 4B
             :                   3E 90 F8 6D EA 9C C9 21 8A 3B 76 14
             :                   E9 CE 2E 5D A3 07 CD 23 85 B8 2F 30
             :                   01 7C 6D 49 89 11 89 36 44 BD F8 C8
             :                   95 4A 53 56 B5 E2 F9 73 EC 1A 61 36
             :                   1F 11 7F C2 BD ED D1 50 FF 98 74 C2
             :                   D1 81 4A 60 39 BA 36 39
             :                   }
             :                 }
 494 03  132:                 BIT STRING 0 unused bits, encapsulates {
 498 02  128:                   INTEGER
             :                   5C E3 B9 5A 75 14 96 0B A9 7A DD E3
             :                   3F A9 EC AC 5E DC BD B7 13 11 34 A6
             :                   16 89 28 11 23 D9 34 86 67 75 75 13
             :                   12 3D 43 5B 6F E5 51 BF FA 89 F2 A2
             :                   1B 3E 24 7D 3D 07 8D 5B 63 C8 BB 45
             :                   A5 A0 4A E3 85 D6 CE 06 80 3F E8 23
             :                   7E 1A F2 24 AB 53 1A B8 27 0D 1E EF
             :                   08 BF 66 14 80 5C 62 AC 65 FA 15 8B
             :                   F1 BB 34 D4 D2 96 37 F6 61 47 B2 C4
             :                   32 84 F0 7E 41 40 FD 46 A7 63 4E 33
             :                   F2 A5 E2 F4 F2 83 E5 B8
             :                   }
             :                 }
 629 A3  129:               [3] {
 632 30  127:                 SEQUENCE {
 634 30   12:                   SEQUENCE {
 636 06    3:                     OBJECT IDENTIFIER
```

```
           :                   basicConstraints (2 5 29 19)
           :                   (X.509 id-ce (2 5 29))
 641 01    1:                 BOOLEAN TRUE
 644 04    2:                 OCTET STRING, encapsulates {
 646 30    0:                     SEQUENCE {}
           :                     }
           :                 }
 648 30   14:               SEQUENCE {
 650 06    3:                 OBJECT IDENTIFIER
           :                   keyUsage (2 5 29 15)
           :                   (X.509 id-ce (2 5 29))
 655 01    1:                 BOOLEAN TRUE
 658 04    4:                 OCTET STRING, encapsulates {
 660 03    2:                     BIT STRING 6 unused bits
           :                       '11'B
           :                     }
           :                 }
 664 30   31:               SEQUENCE {
 666 06    3:                 OBJECT IDENTIFIER
           :                   authorityKeyIdentifier (2 5 29 35)
           :                   (X.509 id-ce (2 5 29))
 671 04   24:                 OCTET STRING, encapsulates {
 673 30   22:                     SEQUENCE {
 675 80   20:                       [0]
           :                     70 44 3E 82 2E 6F 87 DE 4A D3 75 E3
           :                     3D 20 BC 43 2B 93 F1 1F
           :                       }
           :                     }
           :                 }
 697 30   29:               SEQUENCE {
 699 06    3:                 OBJECT IDENTIFIER
           :                   subjectKeyIdentifier (2 5 29 14)
           :                   (X.509 id-ce (2 5 29))
 704 04   22:                 OCTET STRING, encapsulates {
 706 04   20:                     OCTET STRING
           :                   BE 6C A1 B3 E3 C1 F7 ED 43 70 A4 CE
           :                   13 01 E2 FD E3 97 FE CD
           :                     }
           :                 }
 728 30   31:               SEQUENCE {
 730 06    3:                 OBJECT IDENTIFIER
           :                   subjectAltName (2 5 29 17)
           :                   (X.509 id-ce (2 5 29))
 735 04   24:                 OCTET STRING, encapsulates {
 737 30   22:                     SEQUENCE {
 739 81   20:                       [1] 'AliceDSS@example.com'
           :                       }
           :                     }
```

```
            :                   }
            :                 }
            :               }
            :             }
 761 30    9:             SEQUENCE {
 763 06    7:               OBJECT IDENTIFIER
            :                 dsaWithSha1 (1 2 840 10040 4 3)
            :                 (ANSI X9.57 algorithm)
            :               }
 772 03   48:               BIT STRING 0 unused bits, encapsulates {
 775 30   45:                 SEQUENCE {
 777 02   20:                   INTEGER
            :                     55 0C A4 19 1F 42 2B 89 71 22 33 8D
            :                     83 6A B5 3D 67 6B BF 45
 799 02   21:                   INTEGER
            :                     00 9F 61 53 52 54 0B 5C B2 DD DA E7
            :                     76 1D E2 10 52 5B 43 5E BD
            :                   }
            :                 }
            :               }
            :             }
 822 31 1225:           SET {
 826 30 1221:             SEQUENCE {
 830 02    1:               INTEGER 1
 833 30   24:               SEQUENCE {
 835 30   18:                 SEQUENCE {
 837 31   16:                   SET {
 839 30   14:                     SEQUENCE {
 841 06    3:                       OBJECT IDENTIFIER
            :                         commonName (2 5 4 3)
            :                         (X.520 id-at (2 5 4))
 846 13    7:                       PrintableString 'CarlDSS'
            :                       }
            :                     }
            :                   }
 855 02    2:                 INTEGER 200
            :                 }
 859 30    7:               SEQUENCE {
 861 06    5:                 OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
            :                   (OIW)
            :                 }
 868 A0 1119:               [0] {
 872 30   24:                 SEQUENCE {
 874 06    9:                   OBJECT IDENTIFIER
            :                     contentType (1 2 840 113549 1 9 3)
            :                     (PKCS #9 (1 2 840 113549 1 9))
 885 31   11:                   SET {
 887 06    9:                     OBJECT IDENTIFIER
```

```
            :                 data (1 2 840 113549 1 7 1)
            :                 (PKCS #7)
            :               }
            :             }
 898 30   35:             SEQUENCE {
 900 06    9:               OBJECT IDENTIFIER
            :                 messageDigest (1 2 840 113549 1 9 4)
            :                 (PKCS #9 (1 2 840 113549 1 9))
 911 31   22:               SET {
 913 04   20:                 OCTET STRING
            :                   40 6A EC 08 52 79 BA 6E 16 02 2D 9E
            :                   06 29 C0 22 96 87 DD 48
            :                 }
            :               }
 935 30   56:             SEQUENCE {
 937 06    3:               OBJECT IDENTIFIER '1 2 5555'
 942 31   49:               SET {
 944 04   47:                 OCTET STRING
            :                   'This is a test General ASN Attribut'
            :                   'e, number 1.'
            :                 }
            :               }
 993 30   62:             SEQUENCE {
 995 06   11:               OBJECT IDENTIFIER
            :                 id-aa-contentHint
            :                     (1 2 840 113549 1 9 16 2 4)
            :                 (S/MIME Authenticated Attributes
            :                     (1 2 840 113549 1 9 16 2))
1008 31   47:               SET {
1010 30   45:                 SEQUENCE {
1012 0C   32:                   UTF8String
            :                   'Content Hints Description Buffer'
1046 06    9:                   OBJECT IDENTIFIER
            :                     data (1 2 840 113549 1 7 1)
            :                     (PKCS #7)
            :                   }
            :                 }
            :               }
1057 30   74:             SEQUENCE {
1059 06    9:               OBJECT IDENTIFIER
            :                 sMIMECapabilities
            :                     (1 2 840 113549 1 9 15)
            :                 (PKCS #9
            :                     (1 2 840 113549 1 9))
1070 31   61:               SET {
1072 30   59:                 SEQUENCE {
1074 30    7:                   SEQUENCE {
1076 06    5:                     OBJECT IDENTIFIER '1 2 3 4 5 6'
```

```
          :                     }
1083 30   48:                   SEQUENCE {
1085 06    6:                     OBJECT IDENTIFIER '1 2 3 4 5 6 77'
1093 04   38:                     OCTET STRING
          :                     'Smime Capabilities parameters buffe'
          :                     'r 2'
          :                     }
          :                   }
          :                 }
1133 30  109:               SEQUENCE {
1135 06   11:                 OBJECT IDENTIFIER
          :                   id-aa-securityLabel
          :                       (1 2 840 113549 1 9 16 2 2)
          :                   (S/MIME Authenticated Attributes
          :                       (1 2 840 113549 1 9 16 2))
1148 31   94:                 SET {
1150 31   92:                   SET {
1152 02    1:                     INTEGER 1
1155 06    7:                     OBJECT IDENTIFIER '1 2 3 4 5 6 7 8'
1164 13   27:                     PrintableString
          :                     'THIS IS A PRIVACY MARK TEST'
1193 31   49:                     SET {
1195 30   47:                       SEQUENCE {
1197 80    8:                         [0]
          :                       2A 03 04 05 06 07 86 78
1207 A1   35:                         [1] {
1209 13   33:                           PrintableString
          :                           'THIS IS A TEST SECURITY-'
          :                           'CATEGORY.'
          :                           }
          :                       }
          :                     }
          :                   }
          :                 }
1244 30  111:               SEQUENCE {
1246 06   11:                 OBJECT IDENTIFIER
          :                   id-aa-contentReference
          :                       (1 2 840 113549 1 9 16 2 10)
          :                   (S/MIME Authenticated Attributes
          :                       (1 2 840 113549 1 9 16 2))
1259 31   96:                 SET {
1261 30   94:                   SEQUENCE {
1263 06    5:                     OBJECT IDENTIFIER '1 2 3 4 5 6'
1270 04   43:                     OCTET STRING
          :                     'Content Reference Content Identifie'
          :                     'r Buffer'
```

```
1315 04   40:                  OCTET STRING
           :                  'Content Reference Signature Value B'
           :                  'uffer'
           :                  }
           :                }
           :              }
1357 30  115:              SEQUENCE {
1359 06   11:                OBJECT IDENTIFIER
           :                  id-aa-encrypKeyPref
           :                      (1 2 840 113549 1 9 16 2 11)
           :                  (S/MIME Authenticated Attributes
           :                      (1 2 840 113549 1 9 16 2))
1372 31  100:                SET {
1374 A0   98:                  [0] {
1376 30   90:                    SEQUENCE {
1378 31   11:                      SET {
1380 30    9:                        SEQUENCE {
1382 06    3:                          OBJECT IDENTIFIER
           :                            countryName (2 5 4 6)
           :                            (X.520 id-at (2 5 4))
1387 13    2:                          PrintableString 'US'
           :                          }
           :                        }
1391 31   22:                      SET {
1393 30   20:                        SEQUENCE {
1395 06    3:                          OBJECT IDENTIFIER
           :                            organizationName (2 5 4 10)
           :                            (X.520 id-at (2 5 4))
1400 13   13:                          PrintableString 'US Government'
           :                          }
           :                        }
1415 31   17:                      SET {
1417 30   15:                        SEQUENCE {
1419 06    3:                          OBJECT IDENTIFIER
           :                            organizationalUnitName
           :                                (2 5 4 11)
           :                            (X.520 id-at (2 5 4))
1424 13    8:                          PrintableString 'VDA Site'
           :                          }
           :                        }
1434 31   12:                      SET {
1436 30   10:                        SEQUENCE {
1438 06    3:                          OBJECT IDENTIFIER
           :                            organizationalUnitName
           :                                (2 5 4 11)
           :                            (X.520 id-at (2 5 4))
1443 13    3:                          PrintableString 'VDA'
           :                          }
```

```
            :                     }
1448 31   18:                   SET {
1450 30   16:                     SEQUENCE {
1452 06    3:                       OBJECT IDENTIFIER
            :                         commonName (2 5 4 3)
            :                         (X.520 id-at (2 5 4))
1457 13    9:                       PrintableString 'Daisy RSA'
            :                       }
            :                     }
            :                   }
1468 02    4:                 INTEGER 173360179
            :                 }
            :               }
            :             }
1474 30  252:           SEQUENCE {
1477 06   11:             OBJECT IDENTIFIER
            :               id-aa-mlExpandHistory
            :                   (1 2 840 113549 1 9 16 2 3)
            :               (S/MIME Authenticated Attributes
            :                   (1 2 840 113549 1 9 16 2))
1490 31  236:             SET {
1493 30  233:               SEQUENCE {
1496 30  230:                 SEQUENCE {
1499 04    7:                   OCTET STRING '5738299'
1508 18   15:                   GeneralizedTime '19990311104433Z'
1525 A1  201:                   [1] {
1528 30  198:                     SEQUENCE {
1531 A4   97:                       [4] {
1533 30   95:                         SEQUENCE {
1535 31   11:                           SET {
1537 30    9:                             SEQUENCE {
1539 06    3:                               OBJECT IDENTIFIER
            :                                 countryName (2 5 4 6)
            :                                 (X.520 id-at (2 5 4))
1544 13    2:                               PrintableString 'US'
            :                               }
            :                             }
1548 31   22:                           SET {
1550 30   20:                             SEQUENCE {
1552 06    3:                               OBJECT IDENTIFIER
            :                                 organizationName
            :                                     (2 5 4 10)
            :                                 (X.520 id-at (2 5 4))
1557 13   13:                               PrintableString
            :                               'US Government'
            :                               }
            :                             }
1572 31   17:                           SET {
```

```
1574 30   15:                            SEQUENCE {
1576 06    3:                              OBJECT IDENTIFIER
            :                                organizationalUnitName
            :                                    (2 5 4 11)
            :                              (X.520 id-at (2 5 4))
1581 13    8:                              PrintableString
            :                              'VDA Site'
            :                              }
            :                            }
1591 31   12:                           SET {
1593 30   10:                             SEQUENCE {
1595 06    3:                               OBJECT IDENTIFIER
            :                                organizationalUnitName
            :                                    (2 5 4 11)
            :                              (X.520 id-at (2 5 4))
1600 13    3:                              PrintableString 'VDA'
            :                              }
            :                            }
1605 31   23:                           SET {
1607 30   21:                             SEQUENCE {
1609 06    3:                               OBJECT IDENTIFIER
            :                                commonName (2 5 4 3)
            :                              (X.520 id-at (2 5 4))
1614 13   14:                              PrintableString
            :                              'Bugs Bunny DSA'
            :                              }
            :                            }
            :                          }
            :                        }
1630 A4   97:                       [4] {
1632 30   95:                         SEQUENCE {
1634 31   11:                           SET {
1636 30    9:                             SEQUENCE {
1638 06    3:                               OBJECT IDENTIFIER
            :                                countryName (2 5 4 6)
            :                              (X.520 id-at (2 5 4))
1643 13    2:                              PrintableString 'US'
            :                              }
            :                            }
1647 31   22:                           SET {
1649 30   20:                             SEQUENCE {
1651 06    3:                               OBJECT IDENTIFIER
            :                                organizationName
            :                                    (2 5 4 10)
            :                              (X.520 id-at (2 5 4))
1656 13   13:                              PrintableString
            :                              'US Government'
            :                              }
```

```
            :                               }
1671 31   17:                             SET {
1673 30   15:                               SEQUENCE {
1675 06    3:                                 OBJECT IDENTIFIER
            :                                   organizationalUnitName
            :                                       (2 5 4 11)
            :                                   (X.520 id-at (2 5 4))
1680 13    8:                                 PrintableString
            :                                 'VDA Site'
            :                                 }
            :                               }
1690 31   12:                             SET {
1692 30   10:                               SEQUENCE {
1694 06    3:                                 OBJECT IDENTIFIER
            :                                   organizationalUnitName
            :                                       (2 5 4 11)
            :                                   (X.520 id-at (2 5 4))
1699 13    3:                                 PrintableString 'VDA'
            :                                 }
            :                               }
1704 31   23:                             SET {
1706 30   21:                               SEQUENCE {
1708 06    3:                                 OBJECT IDENTIFIER
            :                                   commonName (2 5 4 3)
            :                                   (X.520 id-at (2 5 4))
1713 13   14:                                 PrintableString
            :                                 'Elmer Fudd DSA'
            :                                 }
            :                               }
            :                             }
            :                           }
            :                         }
            :                       }
            :                     }
            :                   }
            :                 }
            :               }
1729 30  258:             SEQUENCE {
1733 06   11:               OBJECT IDENTIFIER
            :                 id-aa-equivalentLabels
            :                     (1 2 840 113549 1 9 16 2 9)
            :                 (S/MIME Authenticated Attributes
            :                     (1 2 840 113549 1 9 16 2))
1746 31  242:               SET {
1749 30  239:                 SEQUENCE {
1752 31  114:                   SET {
1754 02    1:                     INTEGER 1
1757 06    7:                     OBJECT IDENTIFIER '1 2 3 4 5 6 7 9'
```

```
1766 13   38:                    PrintableString
           :                   'EQUIVALENT THIS IS A PRIVACY MARK T'
           :                   'EST'
1806 31   60:                    SET {
1808 30   58:                      SEQUENCE {
1810 80    8:                        [0]
           :                   2A 03 04 05 06 07 86 78
1820 A1   46:                        [1] {
1822 13   44:                          PrintableString
           :                   'EQUIVALENT THIS IS A TEST SECURITY-'
           :                   'CATEGORY.'
           :                         }
           :                       }
           :                     }
           :                   }
1868 31  121:                   SET {
1870 02    1:                     INTEGER 1
1873 06    7:                     OBJECT IDENTIFIER
           :                     '1 2 3 4 5 6 7 10'
1882 13   45:                     PrintableString
           :                   'EQUIVALENT THIS IS A SECOND PRIVACY'
           :                   ' MARK TEST'
1929 31   60:                     SET {
1931 30   58:                       SEQUENCE {
1933 80    8:                         [0]
           :                   2A 03 04 05 06 07 86 78
1943 A1   46:                         [1] {
1945 13   44:                           PrintableString
           :                   'EQUIVALENT THIS IS A TEST SECURITY-'
           :                   'CATEGORY.'
           :                         }
           :                       }
           :                     }
           :                   }
           :                 }
           :               }
           :             }
1991 30    9:           SEQUENCE {
1993 06    7:             OBJECT IDENTIFIER
           :               dsaWithSha1 (1 2 840 10040 4 3)
           :               (ANSI X9.57 algorithm)
           :             }
2002 04   47:           OCTET STRING, encapsulates {
2004 30   45:               SEQUENCE {
2006 02   21:                 INTEGER
           :                   00 BC 33 37 65 C4 F7 70 5C 17 49 13
           :                   AA 4C 85 CA BB 52 91 48 59
```

```
2029 02   20:                  INTEGER
            :                    63 96 A2 14 8B CF 57 DE B0 48 5F 6C
            :                    64 DD 84 04 49 5F 1C CA
            :                  }
            :                }
            :              }
            :            }
            :          }
            :        }
            :      }
```

4.11. SignedData with Certificates Only

CA SignedData message with no content or signature, containing only Alices's and Carl's certificates.

```
 0 30 1672: SEQUENCE {
 4 06    9:   OBJECT IDENTIFIER signedData (1 2 840 113549 1 7 2)
            :     (PKCS #7)
15 A0 1657:   [0] {
19 30 1653:     SEQUENCE {
23 02    1:       INTEGER 1
26 31    0:       SET {}
28 30   11:       SEQUENCE {
30 06    9:         OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
            :           (PKCS #7)
            :         }
41 A0 1407:       [0] {
45 30  667:         SEQUENCE {
49 30  602:           SEQUENCE {
53 A0    3:             [0] {
55 02    1:               INTEGER 2
            :               }
58 02    1:             INTEGER 1
61 30    9:             SEQUENCE {
63 06    7:               OBJECT IDENTIFIER
            :                 dsaWithSha1 (1 2 840 10040 4 3)
            :                 (ANSI X9.57 algorithm)
            :               }
72 30   18:             SEQUENCE {
74 31   16:               SET {
76 30   14:                 SEQUENCE {
78 06    3:                   OBJECT IDENTIFIER
            :                     commonName (2 5 4 3)
            :                     (X.520 id-at (2 5 4))
83 13    7:                   PrintableString 'CarlDSS'
            :                   }
            :                 }
```

```
           :             }
  92 30   30:           SEQUENCE {
  94 17   13:             UTCTime '990816225050Z'
 109 17   13:             UTCTime '391231235959Z'
           :             }
 124 30   18:           SEQUENCE {
 126 31   16:             SET {
 128 30   14:               SEQUENCE {
 130 06    3:                 OBJECT IDENTIFIER
           :                   commonName (2 5 4 3)
           :                   (X.520 id-at (2 5 4))
 135 13    7:                 PrintableString 'CarlDSS'
           :                 }
           :               }
           :             }
 144 30  439:           SEQUENCE {
 148 30  299:             SEQUENCE {
 152 06    7:               OBJECT IDENTIFIER
           :                 dsa (1 2 840 10040 4 1)
           :                 (ANSI X9.57 algorithm)
 161 30  286:               SEQUENCE {
 165 02  129:                 INTEGER
           :                   00 B6 49 18 3E 8A 44 C1 29 71 94 4C
           :                   01 C4 12 C1 7A 79 CB 54 4D AB 1E 81
           :                   FB C6 4C B3 0E 94 09 06 EB 01 D4 B1
           :                   C8 71 4B C7 45 C0 50 25 5D 9C FC DA
           :                   E4 6D D3 E2 86 48 84 82 7D BA 15 95
           :                   4A 16 F6 46 ED DD F6 98 D2 BB 7E 8A
           :                   0A 8A BA 16 7B B9 50 01 48 93 8B EB
           :                   25 15 51 97 55 DC 8F 53 0E 10 A9 50
           :                   FC 70 B7 CD 30 54 FD DA DE A8 AA 22
           :                   B5 A1 AF 8B CC 02 88 E7 8B 70 5F B9
           :                   AD E1 08 D4 6D 29 2D D6 E9
 297 02   21:                 INTEGER
           :                   00 DD C1 2F DF 53 CE 0B 34 60 77 3E
           :                   02 A4 BF 8A 5D 98 B9 10 D5
 320 02  128:                 INTEGER
           :                   0C EE 57 9B 4B BD DA B6 07 6A 74 37
           :                   4F 55 7F 9D ED BC 61 0D EB 46 59 3C
           :                   56 0B 2B 5B 0C 91 CE A5 62 52 69 CA
           :                   E1 6D 3E BD BF FE E1 B7 B9 2B 61 3C
           :                   AD CB AE 45 E3 06 AC 8C 22 9D 9C 44
           :                   87 0B C7 CD F0 1C D9 B5 4E 5D 73 DE
           :                   AF 0E C9 1D 5A 51 F5 4F 44 79 35 5A
           :                   73 AA 7F 46 51 1F A9 42 16 9C 48 EB
           :                   8A 79 61 B4 D5 2F 53 22 44 63 1F 86
           :                   B8 A3 58 06 25 F8 29 C0 EF BA E0 75
           :                   F0 42 C4 63 65 52 9B 0A
```

```
           :                   }
           :                 }
 451 03  133:               BIT STRING 0 unused bits, encapsulates {
 455 02  129:                   INTEGER
           :                   00 99 87 74 27 03 66 A0 B1 C0 AD DC
           :                   2C 75 BB E1 6C 44 9C DA 21 6D 4D 47
           :                   6D B1 62 09 E9 D8 AE 1E F2 3A B4 94
           :                   B1 A3 8E 7A 9B 71 4E 00 94 C9 B4 25
           :                   4E B9 60 96 19 24 01 F3 62 0C FE 75
           :                   C0 FB CE D8 68 00 E3 FD D5 70 4F DF
           :                   23 96 19 06 94 F4 B1 61 8F 3A 57 B1
           :                   08 11 A4 0B 26 25 F0 52 76 81 EA 0B
           :                   62 0D 95 2A E6 86 BA 72 B2 A7 50 83
           :                   0B AA 27 CD 1B A9 4D 89 9A D7 8D 18
           :                   39 84 3F 8B C5 56 4D 80 7A
           :                   }
           :               }
 587 A3   66:              [3] {
 589 30   64:                SEQUENCE {
 591 30   15:                  SEQUENCE {
 593 06    3:                    OBJECT IDENTIFIER
           :                     basicConstraints (2 5 29 19)
           :                     (X.509 id-ce (2 5 29))
 598 01    1:                    BOOLEAN TRUE
 601 04    5:                    OCTET STRING, encapsulates {
 603 30    3:                        SEQUENCE {
 605 01    1:                          BOOLEAN TRUE
           :                           }
           :                       }
           :                   }
 608 30   14:                  SEQUENCE {
 610 06    3:                    OBJECT IDENTIFIER
           :                     keyUsage (2 5 29 15)
           :                     (X.509 id-ce (2 5 29))
 615 01    1:                    BOOLEAN TRUE
 618 04    4:                    OCTET STRING, encapsulates {
 620 03    2:                        BIT STRING 1 unused bits
           :                         '1100001'B
           :                       }
           :                   }
 624 30   29:                  SEQUENCE {
 626 06    3:                    OBJECT IDENTIFIER
           :                     subjectKeyIdentifier (2 5 29 14)
           :                     (X.509 id-ce (2 5 29))
 631 04   22:                    OCTET STRING, encapsulates {
 633 04   20:                        OCTET STRING
           :                     70 44 3E 82 2E 6F 87 DE 4A D3 75 E3
           :                     3D 20 BC 43 2B 93 F1 1F
```

```
            :                     }
            :                   }
            :                 }
            :               }
            :             }
 655 30    9:           SEQUENCE {
 657 06    7:             OBJECT IDENTIFIER
            :               dsaWithSha1 (1 2 840 10040 4 3)
            :               (ANSI X9.57 algorithm)
            :             }
 666 03   48:           BIT STRING 0 unused bits, encapsulates {
 669 30   45:               SEQUENCE {
 671 02   20:                 INTEGER
            :                   6B A9 F0 4E 7A 5A 79 E3 F9 BE 3D 2B
            :                   C9 06 37 E9 11 17 A1 13
 693 02   21:                 INTEGER
            :                   00 8F 34 69 2A 8B B1 3C 03 79 94 32
            :                   4D 12 1F CE 89 FB 46 B2 3B
            :                 }
            :               }
            :           }
 716 30  732:         SEQUENCE {
 720 30  667:           SEQUENCE {
 724 A0    3:             [0] {
 726 02    1:               INTEGER 2
            :               }
 729 02    2:             INTEGER 200
 733 30    9:             SEQUENCE {
 735 06    7:               OBJECT IDENTIFIER
            :                 dsaWithSha1 (1 2 840 10040 4 3)
            :                 (ANSI X9.57 algorithm)
            :               }
 744 30   18:             SEQUENCE {
 746 31   16:               SET {
 748 30   14:                 SEQUENCE {
 750 06    3:                   OBJECT IDENTIFIER
            :                     commonName (2 5 4 3)
            :                     (X.520 id-at (2 5 4))
 755 13    7:                   PrintableString 'CarlDSS'
            :                   }
            :                 }
            :               }
 764 30   30:             SEQUENCE {
 766 17   13:               UTCTime '990817011049Z'
 781 17   13:               UTCTime '991231235959Z'
            :               }
 796 30   19:             SEQUENCE {
 798 31   17:               SET {
```

```
 800 30   15:                SEQUENCE {
 802 06    3:                  OBJECT IDENTIFIER
             :                    commonName (2 5 4 3)
             :                    (X.520 id-at (2 5 4))
 807 13    8:                  PrintableString 'AliceDSS'
             :                  }
             :                }
             :              }
 817 30  438:              SEQUENCE {
 821 30  299:                SEQUENCE {
 825 06    7:                  OBJECT IDENTIFIER
             :                    dsa (1 2 840 10040 4 1)
             :                    (ANSI X9.57 algorithm)
 834 30  286:                  SEQUENCE {
 838 02  129:                    INTEGER
             :                    00 81 8D CD ED 83 EA 0A 9E 39 3E C2
             :                    48 28 A3 E4 47 93 DD 0E D7 A8 0E EC
             :                    53 C5 AB 84 08 4F FF 94 E1 73 48 7E
             :                    0C D6 F3 44 48 D1 FE 9F AF A4 A1 89
             :                    2F E1 D9 30 C8 36 DE 3F 9B BF B7 4C
             :                    DC 5F 69 8A E4 75 D0 37 0C 91 08 95
             :                    9B DE A7 5E F9 FC F4 9F 2F DD 43 A8
             :                    8B 54 F1 3F B0 07 08 47 4D 5D 88 C3
             :                    C3 B5 B3 E3 55 08 75 D5 39 76 10 C4
             :                    78 BD FF 9D B0 84 97 37 F2 E4 51 1B
             :                    B5 E4 09 96 5C F3 7E 5B DB
 970 02   21:                    INTEGER
             :                    00 E2 47 A6 1A 45 66 B8 13 C6 DA 8F
             :                    B8 37 21 2B 62 8B F7 93 CD
 993 02  128:                    INTEGER
             :                    26 38 D0 14 89 32 AA 39 FB 3E 6D D9
             :                    4B 59 6A 4C 76 23 39 04 02 35 5C F2
             :                    CB 1A 30 C3 1E 50 5D DD 9B 59 E2 CD
             :                    AA 05 3D 58 C0 7B A2 36 B8 6E 07 AF
             :                    7D 8A 42 25 A7 F4 75 CF 4A 08 5E 4B
             :                    3E 90 F8 6D EA 9C C9 21 8A 3B 76 14
             :                    E9 CE 2E 5D A3 07 CD 23 85 B8 2F 30
             :                    01 7C 6D 49 89 11 89 36 44 BD F8 C8
             :                    95 4A 53 56 B5 E2 F9 73 EC 1A 61 36
             :                    1F 11 7F C2 BD ED D1 50 FF 98 74 C2
             :                    D1 81 4A 60 39 BA 36 39
             :                    }
             :                  }
1124 03  132:                BIT STRING 0 unused bits, encapsulates {
1128 02  128:                    INTEGER
             :                    5C E3 B9 5A 75 14 96 0B A9 7A DD E3
             :                    3F A9 EC AC 5E DC BD B7 13 11 34 A6
             :                    16 89 28 11 23 D9 34 86 67 75 75 13
```

```
            :                   12 3D 43 5B 6F E5 51 BF FA 89 F2 A2
            :                   1B 3E 24 7D 3D 07 8D 5B 63 C8 BB 45
            :                   A5 A0 4A E3 85 D6 CE 06 80 3F E8 23
            :                   7E 1A F2 24 AB 53 1A B8 27 0D 1E EF
            :                   08 BF 66 14 80 5C 62 AC 65 FA 15 8B
            :                   F1 BB 34 D4 D2 96 37 F6 61 47 B2 C4
            :                   32 84 F0 7E 41 40 FD 46 A7 63 4E 33
            :                   F2 A5 E2 F4 F2 83 E5 B8
            :                   }
            :               }
1259 A3  129:               [3] {
1262 30  127:                 SEQUENCE {
1264 30   12:                   SEQUENCE {
1266 06    3:                     OBJECT IDENTIFIER
            :                       basicConstraints (2 5 29 19)
            :                       (X.509 id-ce (2 5 29))
1271 01    1:                     BOOLEAN TRUE
1274 04    2:                     OCTET STRING, encapsulates {
1276 30    0:                       SEQUENCE {}
            :                       }
            :                     }
1278 30   14:                   SEQUENCE {
1280 06    3:                     OBJECT IDENTIFIER
            :                       keyUsage (2 5 29 15)
            :                       (X.509 id-ce (2 5 29))
1285 01    1:                     BOOLEAN TRUE
1288 04    4:                     OCTET STRING, encapsulates {
1290 03    2:                       BIT STRING 6 unused bits
            :                         '11'B
            :                       }
            :                     }
1294 30   31:                   SEQUENCE {
1296 06    3:                     OBJECT IDENTIFIER
            :                       authorityKeyIdentifier (2 5 29 35)
            :                       (X.509 id-ce (2 5 29))
1301 04   24:                     OCTET STRING, encapsulates {
1303 30   22:                       SEQUENCE {
1305 80   20:                         [0]
            :                     70 44 3E 82 2E 6F 87 DE 4A D3 75 E3
            :                     3D 20 BC 43 2B 93 F1 1F
            :                         }
            :                       }
            :                     }
1327 30   29:                   SEQUENCE {
1329 06    3:                     OBJECT IDENTIFIER
            :                       subjectKeyIdentifier (2 5 29 14)
            :                       (X.509 id-ce (2 5 29))
1334 04   22:                     OCTET STRING, encapsulates {
```

```
1336 04   20:                      OCTET STRING
           :                    BE 6C A1 B3 E3 C1 F7 ED 43 70 A4 CE
           :                    13 01 E2 FD E3 97 FE CD
           :                      }
           :                    }
1358 30   31:                  SEQUENCE {
1360 06    3:                    OBJECT IDENTIFIER
           :                      subjectAltName (2 5 29 17)
           :                      (X.509 id-ce (2 5 29))
1365 04   24:                    OCTET STRING, encapsulates {
1367 30   22:                      SEQUENCE {
1369 81   20:                        [1] 'AliceDSS@example.com'
           :                        }
           :                      }
           :                    }
           :                  }
           :                }
           :              }
1391 30    9:            SEQUENCE {
1393 06    7:              OBJECT IDENTIFIER
           :                dsaWithSha1 (1 2 840 10040 4 3)
           :                (ANSI X9.57 algorithm)
           :              }
1402 03   48:            BIT STRING 0 unused bits, encapsulates {
1405 30   45:              SEQUENCE {
1407 02   20:                INTEGER
           :                  55 0C A4 19 1F 42 2B 89 71 22 33 8D
           :                  83 6A B5 3D 67 6B BF 45
1429 02   21:                INTEGER
           :                  00 9F 61 53 52 54 0B 5C B2 DD DA E7
           :                  76 1D E2 10 52 5B 43 5E BD
           :                }
           :              }
           :            }
           :          }
1452 A1  219:        [1] {
1455 30  216:          SEQUENCE {
1458 30  153:            SEQUENCE {
1461 30    9:              SEQUENCE {
1463 06    7:                OBJECT IDENTIFIER
           :                  dsaWithSha1 (1 2 840 10040 4 3)
           :                  (ANSI X9.57 algorithm)
           :                }
1472 30   18:              SEQUENCE {
1474 31   16:                SET {
1476 30   14:                  SEQUENCE {
1478 06    3:                    OBJECT IDENTIFIER
           :                      commonName (2 5 4 3)
```

```
            :                     (X.520 id-at (2 5 4))
1483 13    7:                   PrintableString 'CarlDSS'
            :                   }
            :                 }
            :               }
1492 17   13:             UTCTime '990827070000Z'
1507 30  105:             SEQUENCE {
1509 30   19:               SEQUENCE {
1511 02    2:                 INTEGER 200
1515 17   13:                 UTCTime '990822070000Z'
            :                 }
1530 30   19:               SEQUENCE {
1532 02    2:                 INTEGER 201
1536 17   13:                 UTCTime '990822070000Z'
            :                 }
1551 30   19:               SEQUENCE {
1553 02    2:                 INTEGER 211
1557 17   13:                 UTCTime '990822070000Z'
            :                 }
1572 30   19:               SEQUENCE {
1574 02    2:                 INTEGER 210
1578 17   13:                 UTCTime '990822070000Z'
            :                 }
1593 30   19:               SEQUENCE {
1595 02    2:                 INTEGER 212
1599 17   13:                 UTCTime '990824070000Z'
            :                 }
            :               }
            :             }
1614 30    9:           SEQUENCE {
1616 06    7:             OBJECT IDENTIFIER
            :               dsaWithSha1 (1 2 840 10040 4 3)
            :               (ANSI X9.57 algorithm)
            :             }
1625 03   47:           BIT STRING 0 unused bits, encapsulates {
1628 30   44:               SEQUENCE {
1630 02   20:                 INTEGER
            :                   7E 65 52 76 33 FE 34 73 17 D1 F7 96
            :                   F9 A0 D4 D8 6D 5C 7D 3D
1652 02   20:                 INTEGER
            :                   02 7A 5B B7 D5 5B 18 C1 CF 87 EF 7E
            :                   DA 24 F3 2A 83 9C 35 A1
            :                 }
            :               }
            :           }
            :         }
1674 31    0:       SET {}
            :       }
```

```
            :     }
            :   }
```

5. Enveloped-data

5.1. Basic Encrypted Content, TripleDES and RSA

An EnvelopedData from Alice to Bob of ExContent using TripleDES for encrypting and RSA for key management. Does not have an OriginatorInfo.

```
   0 30  286: SEQUENCE {
   4 06    9:   OBJECT IDENTIFIER
             :     envelopedData (1 2 840 113549 1 7 3)
             :     (PKCS #7)
  15 A0  271:   [0] {
  19 30  267:     SEQUENCE {
  23 02    1:       INTEGER 0
  26 31  192:       SET {
  29 30  189:         SEQUENCE {
  32 02    1:           INTEGER 0
  35 30   38:           SEQUENCE {
  37 30   18:             SEQUENCE {
  39 31   16:               SET {
  41 30   14:                 SEQUENCE {
  43 06    3:                   OBJECT IDENTIFIER
             :                     commonName (2 5 4 3)
             :                     (X.520 id-at (2 5 4))
  48 13    7:                   PrintableString 'CarlRSA'
             :                   }
             :                 }
             :               }
  57 02   16:             INTEGER
             :               46 34 6B C7 80 00 56 BC 11 D3 6E 2E
             :               CD 5D 71 D0
             :             }
  75 30   13:           SEQUENCE {
  77 06    9:             OBJECT IDENTIFIER
             :               rsaEncryption (1 2 840 113549 1 1 1)
             :               (PKCS #1)
  88 05    0:             NULL
             :             }
  90 04  128:           OCTET STRING
             :             0B 71 0D E6 71 88 88 98 B6 96 C1 8F
             :             70 FD A2 27 DE DA E1 EF 24 6C A4 33
             :             DF AC E0 E9 9D A2 D3 2C 7A CD 80 B8
             :             99 9E E6 5F B1 41 B3 72 16 83 E7 FA
             :             2A 00 8B C7 73 35 78 26 D6 C7 CF 8C
```

```
                :             0C 56 DB A5 76 9D 08 38 0E F3 F9 D4
                :             91 43 58 78 DC 49 B6 EC EE 6C 68 33
                :             A3 21 1D F0 28 78 1F F7 5D F6 07 73
                :             4D DF AD 69 31 20 4B 48 A9 75 22 6E
                :             36 79 15 63 8F CC EB 9D A3 28 A1 D1
                :             2C 57 F4 DA 1A 2C 75 1F
                :           }
                :         }
    221 30   67:         SEQUENCE {
    223 06    9:           OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
                :             (PKCS #7)
    234 30   20:           SEQUENCE {
    236 06    8:             OBJECT IDENTIFIER
                :               des-EDE3-CBC (1 2 840 113549 3 7)
                :               (RSADSI encryptionAlgorithm
                :                   (1 2 840 113549 3))
    246 04    8:             OCTET STRING
                :               2D 68 C5 E9 47 06 51 35
                :             }
    256 80   32:           [0]
                :             0E C8 92 7F C6 7D 3F 8D CB AD 8E 0E
                :             C5 49 3A EB 47 2E D6 55 DE 09 21 4E
                :             48 EA 4E 27 B1 6E 57 25
                :           }
                :         }
                :       }
                :     }
```

5.2. Basic Encrypted Content, RC2/128 and RSA

Same as 5.1, except using RC2/128 for encryption and RSA for key management. An EnvelopedData from Alice to Bob of ExContent using RC2/40 for encrypting and RSA for key management. Does not have an OriginatorInfo or any attributes.

```
     0 30  291: SEQUENCE {
     4 06    9:   OBJECT IDENTIFIER
                :     envelopedData (1 2 840 113549 1 7 3)
                :     (PKCS #7)
    15 A0  276:   [0] {
    19 30  272:     SEQUENCE {
    23 02    1:       INTEGER 0
    26 31  192:       SET {
    29 30  189:         SEQUENCE {
    32 02    1:           INTEGER 0
    35 30   38:           SEQUENCE {
    37 30   18:             SEQUENCE {
    39 31   16:               SET {
```

```
     41 30   14:                SEQUENCE {
     43 06    3:                  OBJECT IDENTIFIER
              :                    commonName (2 5 4 3)
              :                    (X.520 id-at (2 5 4))
     48 13    7:                  PrintableString 'CarlRSA'
              :                  }
              :                }
              :              }
     57 02   16:              INTEGER
              :                46 34 6B C7 80 00 56 BC 11 D3 6E 2E
              :                CD 5D 71 D0
              :              }
     75 30   13:            SEQUENCE {
     77 06    9:              OBJECT IDENTIFIER
              :                rsaEncryption (1 2 840 113549 1 1 1)
              :                (PKCS #1)
     88 05    0:              NULL
              :              }
     90 04  128:            OCTET STRING
              :              85 42 BE E3 0B 2E E5 0F 09 AA 24 CA
              :              DE DA C1 D3 09 B8 27 2B 25 CB D5 71
              :              FB C9 9C DB F0 B2 6E A0 8A 5F 1C 9D
              :              4A ED 98 9D 15 39 26 01 1A 2E 6B F0
              :              44 39 89 37 3C 6F C7 4A 61 0B 0B 27
              :              77 AA F9 D4 97 A4 D2 21 3F C2 3F 20
              :              D4 DC 10 E9 D6 3F 00 DB 9C 82 47 D6
              :              7E 96 FF 12 6E 87 84 A0 BA ED 81 0F
              :              56 6D A6 1D EB AB C3 B7 A1 B9 F8 5F
              :              8B CC 1B 4A E5 14 36 06 61 D0 C7 64
              :              5F 69 67 91 A9 50 EE D8
              :            }
              :          }
    221 30   72:        SEQUENCE {
    223 06    9:          OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
              :            (PKCS #7)
    234 30   25:          SEQUENCE {
    236 06    8:            OBJECT IDENTIFIER rc2CBC (1 2 840 113549 3 2)
              :              (RSADSI encryptionAlgorithm
              :                  (1 2 840 113549 3))
    246 30   13:            SEQUENCE {
    248 02    1:              INTEGER 58
    251 04    8:              OCTET STRING
              :                E8 70 81 E2 EF C5 15 57
              :              }
              :            }
    261 80   32:          [0]
              :            06 53 0A 7B 8D 5C 16 0D CC D5 76 D6
              :            8B 59 D6 45 8C 1A 1A 0C E6 1E F3 DE
```

```
               :           43 56 00 9B 40 8C 38 5D
               :         }
               :       }
               :     }
               :   }
```

5.3. S/MIME application/pkcs7-mime Encrypted Message

A full S/MIME message, including MIME, that includes the body part from 5.1.

```
MIME-Version: 1.0
Message-Id: <00103112005203.00349@amyemily.ig.com>
Date: Tue, 31 Oct 2000 12:00:52 -0600 (Central Standard Time)
From: User1
To: User2
Subject: Example 5.3
Content-Type: application/pkcs7-mime;
        name=smime.p7m;
        smime-type=enveloped-data
Content-Transfer-Encoding: base64
Content-Disposition: attachment; filename=smime.p7m

MIIBHgYJKoZIhvcNAQcDoIIBDzCCAQsCAQAxgcAwgb0CAQAwJjASMRAwDgYDVQQDEwdDYXJ
sUlNBAhBGNGvHgABWvBHTbi7NXXHQMA0GCSqGSIb3DQEBAQUABIGAC3EN5nGIiJi2lsGPcP
2iJ97a4e8kbKQz36zg6Z2i0yx6zYC4mZ7mX7FBs3IWg+f6KgCLx3M1eCbWx8+MDFbbpXadC
DgO8/nUkUNYeNxJtuzubGgzoyEd8Ch4H/dd9gdzTd+taTEgS0ipdSJuNnkVY4/M652jKKHR
LFf02hosdR8wQwYJKoZIhvcNAQcBMBQGCCqGSIb3DQMHBAgtaMXpRwZRNYAgDsiSf8Z9P43
LrY4OxUk660cu1lXeCSFOSOpOJ7FuVyU=
```

6. Digested-data

A DigestedData from Alice to Bob of ExContent using SHA-1.

```
    0 30   94: SEQUENCE {
    2 06    9:   OBJECT IDENTIFIER digestedData (1 2 840 113549 1 7 5)
              :     (PKCS #7)
   13 A0   81:   [0] {
   15 30   79:     SEQUENCE {
   17 02    1:       INTEGER 0
   20 30    7:       SEQUENCE {
   22 06    5:         OBJECT IDENTIFIER sha1 (1 3 14 3 2 26)
              :           (OIW)
              :         }
   29 30   43:       SEQUENCE {
   31 06    9:         OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
              :           (PKCS #7)
   42 A0   30:         [0] {
```

```
     44 04   28:           OCTET STRING 'This is some sample content.'
               :           }
               :         }
     74 04   20:       OCTET STRING
               :         40 6A EC 08 52 79 BA 6E 16 02 2D 9E
               :         06 29 C0 22 96 87 DD 48
               :       }
               :     }
               :   }
```

7. Encrypted-data

7.1. Simple EncryptedData

An EncryptedData from Alice to Bob of ExContent with no attributes.

```
      0 30   87: SEQUENCE {
      2 06    9:   OBJECT IDENTIFIER
                :     encryptedData (1 2 840 113549 1 7 6)
                :     (PKCS #7)
     13 A0   74:   [0] {
     15 30   72:     SEQUENCE {
     17 02    1:       INTEGER 0
     20 30   67:       SEQUENCE {
     22 06    9:         OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
                :           (PKCS #7)
     33 30   20:         SEQUENCE {
     35 06    8:           OBJECT IDENTIFIER
                :             des-EDE3-CBC (1 2 840 113549 3 7)
                :             (RSADSI encryptionAlgorithm
                :                 (1 2 840 113549 3))
     45 04    8:           OCTET STRING
                :             B3 6B 6B FB 62 31 08 4E
                :           }
     55 80   32:         [0]
                :           FA FC ED DB 3F 18 17 1D 38 89 11 EA
                :           34 D6 20 DB F4 C3 D9 58 15 EF 93 3B
                :           9A F5 D7 04 F6 B5 70 E2
                :         }
                :       }
                :     }
                :   }
```

The TripleDES key is:

```
    73 7c 79 1f 25 ea d0 e0 46 29 25 43 52 f7 dc 62
    91 e5 cb 26 91 7a da 32
```

7.2. EncryptedData with Unprotected Attributes

An EncryptedData from Alice to Bob of ExContent with unprotected attributes.

```
   0 30  149: SEQUENCE {
   3 06    9:   OBJECT IDENTIFIER
             :     encryptedData (1 2 840 113549 1 7 6)
             :     (PKCS #7)
  14 A0  135:   [0] {
  17 30  132:     SEQUENCE {
  20 02    1:       INTEGER 2
  23 30   67:       SEQUENCE {
  25 06    9:         OBJECT IDENTIFIER data (1 2 840 113549 1 7 1)
             :           (PKCS #7)
  36 30   20:         SEQUENCE {
  38 06    8:           OBJECT IDENTIFIER
             :             des-EDE3-CBC (1 2 840 113549 3 7)
             :             (RSADSI encryptionAlgorithm
             :                 (1 2 840 113549 3))
  48 04    8:           OCTET STRING
             :             07 27 20 85 90 9E B0 7E
             :           }
  58 80   32:         [0]
             :           D2 20 8F 67 48 8A CB 41 E4 22 68 5D
             :           BE 77 05 52 26 ED E3 01 BD 00 91 58
             :           A7 35 6E BC 4B A2 07 33
             :         }
  92 A1   58:       [1] {
  94 30   56:         SEQUENCE {
  96 06    3:           OBJECT IDENTIFIER '1 2 5555'
 101 31   49:           SET {
 103 04   47:             OCTET STRING
             :               'This is a test General ASN Attribut'
             :               'e, number 1.'
             :             }
             :           }
             :         }
             :       }
             :     }
             :   }
```

8. Security Considerations

Because this document shows examples of S/MIME and CMS messages, this document also inherits all of the security considerations from [SMIME-MSG] and [CMS].

The Perl script in Appendix A writes to the user's local hard drive. A malicious attacker could modify the Perl script in this document. Be sure to read the Perl code carefully before executing it.

9. References

9.1. Normative References

[CMS] Housley, R., "Cryptographic Message Syntax (CMS)", RFC 3852, July 2004.

[PKIX] Housley, R., Polk, W., Ford, W., and D. Solo, "Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile", RFC 3280, April 2002.

[SMIME-MSG] Ramsdell, B., "Secure/Multipurpose Internet Mail Extensions (S/MIME) Version 3.1 Message Specification", RFC 3851, July 2004.

9.2. Informative References

[DVCS] Adams, C., Sylvester, P., Zolotarev, M., and R. Zuccherato, "Internet X.509 Public Key Infrastructure Data Validation and Certification Server Protocols", RFC 3029, February 2001.

A. Binaries of the Examples

This section contains the binaries of the examples shown in the rest of the document. The binaries are stored in a modified Base64 format. There is a Perl program that, when run over the contents of this document, will extract the following binaries and write them out to disk. The program requires Perl.

A.1. How the Binaries and Extractor Works

The program in the next section looks for lines that begin with a '|' character (or some whitespace followed by a '|'), ignoring all other lines. If the line begins with '|', the second character tells what kind of line it is:

```
A line that begins with |* is a comment
A line that begins with |> gives the name of a new file to start
A line that begins with |< tells to end the file (and checks the
      file name for sanity)
A line that begins with |anythingelse is a Base64 line
```

The program writes out a series of files, so you should run this in an empty directory. The program will overwrite files (if it can), but won't delete other files already in the directory.

Run this program with this document as the standard input, such as:

```
./extractsample.pl <draft-ietf-smime-examples
```

If you want to extract without the program, copy all the lines between the "|>" and "|<" markers, remove any page breaks, and remove the "|" in the first column of each line. The result is a valid Base64 blob that can be processed by any Base64 decoder.

A.2. Example Extraction Program

```
#!/usr/bin/perl

# CMS Samples extraction program. v 1.1

# Get all the input as an array of lines
@AllIn = (); while (<STDIN>) { push(@AllIn, $_) }

$Base64Chars = 'ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqr' .
    'stuvwxyz0123456789+/=';
$LineCount = 0; $CurrFile = '';

foreach $Line (@AllIn) {
```

```
    $LineCount++;  # Keep the line counter for error messages
    $Line =~ s/^\s*//;  # Get rid of leading whitespace
    chomp($Line);  # Get rid of CR or CRLF at the end of the line
    if(substr($Line, 0, 1) ne '|') { next }  # Not a special line
    elsif(substr($Line, 1, 1) eq '*') { next }  # It is a comment
    elsif(substr($Line, 1, 1) eq '>')
      { &StartNewFile(substr($Line, 2)) }  # Start a new file
    elsif(substr($Line, 1, 1) eq '<')
      { &EndCurrFile(substr($Line, 2)) }  # End the current file
    else { &DoBase64(substr($Line, 1)) }  # It is a line of Base64
}

sub StartNewFile {
    $TheNewFile = shift(@_);
    if($CurrFile ne '') { die "Was about to start a new file at " .
      "line $LineCount, but the old file, $CurrFile, was open\n" }
    open(OUT, ">$TheNewFile") or
      die "Could not open $TheNewFile for writing: $!\n";
    binmode(OUT);  # This is needed for Windows, is a noop on Unix
    $CurrFile = $TheNewFile;
    $LeftOver = 0;  # Amount left from previous Base64 character
    $NextPos = 0;  # Bit position to start the next Base64 character
                   #     (bits are numbered 01234567)
    $OutString = '';  # Holds the text going out to the file
}

sub EndCurrFile {
    $FileToEnd = shift(@_);
    if($CurrFile ne $FileToEnd) { die "Was about to close " .
      "$FileToEnd at line $LineCount, but that name didn't match " .
      "the name of the currently open file, $CurrFile\n" }
    print OUT $OutString;
    close(OUT);
    $CurrFile = '';
}

sub DoBase64 {
    $TheIn = shift(@_);
    if($CurrFile eq '') { die "Got some Base64 at line $LineCount, " .
      "but appear to not be writing to any particular file.\n" }
    @Chars = split(//, $TheIn);  # Make an array of the characters
    foreach $ThisChar (@Chars) {
    # $ThisVal is the position in the string and the Base64 value
      $ThisVal = index($Base64Chars, $ThisChar);
      if($ThisVal == -1) { die "At line $LineCount, found the " .
          "character $ThisChar, which is not a Base64 character\n" }
      if($ThisVal == 64) { last }  # It is a "=", so we're done
      if ($NextPos == 0 ) {
```

```
          # Don't output anything, just fill the left of $LeftOver
          $LeftOver = $ThisVal * 4;
          $NextPos = 6;
      } elsif ($NextPos == 2) {
        # Add $ThisVal to $LeftOver, output, and reset
          $OutString .= chr($LeftOver + $ThisVal);
          $LeftOver = 0;
          $NextPos = 0;
      } elsif ($NextPos == 4) {
          # Add upper 4 bits of $ThisVal to $LeftOver and output
          $Upper4 = ($ThisVal & 60);
          $OutString .= chr($LeftOver + ($Upper4/4));
          $LeftOver = (($ThisVal - $Upper4) * 64);
          $NextPos = 2;
      } elsif ($NextPos == 6) {
          # Add upper 2 bits of $ThisVal to $LeftOver and output
          $Upper2 = ($ThisVal & 48);
          $OutString .= chr($LeftOver + ($Upper2/16));
          $LeftOver = (($ThisVal - $Upper2) * 16);
          $NextPos = 4;
      } else { die "\$NextPos has an illegal value: $NextPos." }
    }
}
```

B. Examples in Order of Appearance

From Section 2.1

ExContent.bin

```
|* Section 2.1
|>ExContent.bin
|VGhpcyBpcyBzb21lIHNhbXBsZSBjb250ZW50Lg==
|<ExContent.bin
```

From Section 2.2

AlicePrivDSSSign.pri

```
|* Example AlicePrivDSSSign.pri
|>AlicePrivDSSSign.pri
|MIIBSwIBADCCASsGByqGSM44BAEwggEeAoGBAIGNze2D6gqeOT7CSCij5EeT3Q7XqA7sU8
|WrhAhP/5Thc0h+DNbzREjR/p+vpKGJL+HZMMg23j+bv7dM3F9piuR10DcMkQiVm96nXvn8
|9J8v3UOoi1TxP7AHCEdNXYjDw7Wz41UIddU5dhDEeL3/nbCElzfy5FEbteQJllzzflvbAh
|UA4kemGkVmuBPG2o+4NyErYov3k80CgYAmONAUiTKqOfs+bdlLWWpMdiM5BAI1XPLLGjDD
|HlBd3ZtZ4s2qBT1YwHuiNrhuB699ikIlp/R1z0oIXks+kPht6pzJIYo7dhTpzi5dowfNI4
|W4LzABfG1JiRGJNkS9+MiVSlNWteL5c+waYTYfEX/Cve3RUP+YdMLRgUpgObo2OQQXAhUA
|u0RG0aXJRgcu0P561pIH8JqFiT8=
```

```
|<AlicePrivDSSSign.pri
```

AlicePrivRSASign.pri

```
|* Example AlicePrivRSASign.pri
|>AlicePrivRSASign.pri
|MIICdgIBADANBgkqhkiG9w0BAQEFAASCAmAwggJcAgEAAoGBAOCJczmN2PX16Id2OX9OsA
|W7U4PeD7er3H3HdSkNBS5tEt+mhibU0m+qWCn8l+z6glEPMIC+sVCeRkTxLLvYMs/GaG8H
|2bBgrL7uNAlqE/X3BQWT3166NVbZYf8Zf8mB5vhs6odAcO+sbSx0ny36VTq5mXcCpkhSjE
|7zVzhXdFdfAgMBAAECgYAApAPDJ0d2NDRspoa1eUkBSy6K0shissfXSAlqi5H3NvJ11ujN
|FZBgJzFHNWRNlc1nY860n1asLzduHO4Ovygt9DmQbzTYbghb1WVq2EHzE9ctOV7+M8v/Ke
|QDCz0Foo+38Y6idjeweVfTLyvehwYifQRmXskbr4saw+yRRKt/IQJBAPbW4CIhTF8KcP8n
|/OWzUGqd5Q+1hZbGQPqoCrSbmwxVwgEd+TeCihTI8pMOks2lZiG5PNIGv7RVMcncrcqYLd
|ECQQDo3rARJQnSAlEB3oromFD1d3dhpEWTawhVlnNd9MhbEpMic4t/03B/9aSqu3T9PCJq
|2jiRKoZbbBTorkye+o4vAkEAl0zwh5sXf+4bgxsUtgtqkF+GJ1Hht6B/9eSI41m5+R6b0y
|l3OCJI1yKxJZi6PVlTt/oeILLIURYjdZNR56vN8QJALPAkW/qgzYUi6tBuT/pszSHTyOTx
|hERIZHPXKY9+RozsFd7kUbOU5yyZLVVleyTqo2IfPmxNZ0ERO+G+6YMCgwJAWIjZoVA4hG
|qrA7y730v0nG+4tCol+/bkBS9u4oiJIW9LJZ7Qq1CTyr9AcewhJcV/+wLpIZa4M83ixpXu
|b41fKA==
|<AlicePrivRSASign.pri
```

BobPrivRSAEncrypt.pri

```
|* Example BobPrivRSAEncrypt.pri
|>BobPrivRSAEncrypt.pri
|MIIChQIBADANBgkqhkiG9w0BAQEFAASCAmAwggJcAgEAAoGBAKnhZ5g/OdVf8qCTQV6meY
|mFyDVdmpFb+x0B2hlwJhcPvaUi0DWFbXqYZhRBXM+3twg7CcmRuBlpN235ZR572akzJKN/
|O7uvRgGGNjQyywcDWVL8hYsxBLjMGAgUSOZPHPtdYMTgXB9T039T2GkB8QX4enDRvoPGXz
|jPHCyqaqfrAgMBAAECgYBnzUhMmg2PmMIbZf8ig5xt8KYGHbztpwOIlPIcaw+LNd4Ogngw
|y+e6alatd8brUXlweQqg9P5F4Kmy9Bnah5jWMIR05PxZbMHGd9ypkdB8MKCixQheIXFD/A
|0HPfD6bRSeTmPwF1h5HEuYHD09sBvf+iU7o8AsmAX2EAnYh9sDGQJBANDDIsbeopkYdo+N
|vKZ11mY/1I1FUox29XLE6/BGmvE+XKpVC5va3Wtt+Pw7PAhDk7Vb/s7q/WiEI2Kv8zHCue
|UCQQDQUfweIrdb7bWOAcjXq/JY1PeClPNTqBlFy2bKKBlf4hAr84/sajB0+E0R9KfEILVH
|IdxJAfkKICnwJAiEYH2PAkA0umTJSChXdNdVUN5qSO8bKlocSHseIVnDYDubl6nA7xhmqU
|5iUjiEzuUJiEiUacUgFJlaV/4jbOSnI3vQgLeFAkEAni+zN5r7CwZdV+EJBqRd2ZCWBgVf
|JAZAcpw6iIWchw+dYhKIFmioNRobQ+g4wJhprwMKSDIETukPj3d9NDAlBwJAVxhn1grSta
|vCunrnVNqcBU+B1O8BiR4yPWnLMcRSyFRVJQA7HCp8JlDV6abXd8vPFfXuC9WN7rOvTKF8
|Y0ZB9qANMAsGA1UdDzEEAwIAEA==
|<BobPrivRSAEncrypt.pri
```

CarlPrivDSSSign.pri

```
|* Example CarlPrivDSSSign.pri
|>CarlPrivDSSSign.pri
|MIIBSgIBADCCASsGByqGSM44BAEwggEeAoGBALZJGD6KRMEpcZRMAcQSwXp5y1RNqx6B+8
|ZMsw6UCQbrAdSxyHFLx0XAUCVdnPza5G3T4oZIhIJ9uhWVShb2Ru3d9pjSu36KCoq6Fnu5
|UAFIk4vrJRVRl1Xcj1MOEKlQ/HC3zTBU/dreqKoitaGvi8wCiOeLcF+5reEI1G0pLdbpAh
|UA3cEv31POCzRgdz4CpL+KXZi5ENUCgYAM7lebS73atgdqdDdPVX+d7bxhDetGWTxWCytb
```

```
|DJHOpWJSacrhbT69v/7ht7krYTyty65F4wasjCKdnESHC8fN8BzZtU5dc96vDskdWlH1T0
|R5NVpzqn9GUR+pQhacSOuKeWG01S9TIkRjH4a4o1gGJfgpwO+64HXwQsRjZVKbCgQWAhQZ
|szilIWIxUOV/uT4IRnjRPrXlcg==
|<CarlPrivDSSSign.pri

***CarlPrivRSASign.pri***

|* Example CarlPrivRSASign.pri
|>CarlPrivRSASign.pri
|MIICdgIBADANBgkqhkiG9w0BAQEFAASCAmAwggJcAgEAAoGBAORL/xi4JFf0d/9uc3uTcV
|y8MxqSknIj2EFG0M0ROgSzjq+Cnb1RHhd68nYsK4Y5p73XjRpT7OQA1ejsojax7eJQ4jIJ
|ij+fmSWPuE6ruX3VlmXaFqDFvg6uRFvvXvSnKcuC3axE6aqTlCkO+BjWyFde8nbE8hFgOL
|kbPB2XyWrxAgMBAAECgYEArnPkW19bZlrJ18bvOF9TISovYv7eKZp6hmc2531ieHU9c6C8
|KQ7zj73Dycm2+LrWE5vDl3rKavC4hWVOD72nqPdUBkG969wgd5DfYZuab3Te6jvUnIdg7X
|aE8WowN9XgkBb4gEfDGWvtdXe6Su05tl0CRztfG8gcq8vo9SY/pIECQQD/3wmgVgtCUp7E
|TZOzsEm73ueBfSiZ0LFIugs54Rx7IhgztkD2v9yuHdChrQRxWmEKbjvOMNo2n2UlKbunDn
|8LAkEA5GloGF/5V9B8ZokPumMdcssgpIF2ZInNfdHCJ6kurHpWmoUH2TADowOrf4iSUCQB
|qhsHHyBMt8l7Vve2wn6rcwJAVzZsj4wEdmy21O4kRAD4gOKvQgGpDxSE+OcA4I+MJ6QtX6
|LlbbVjwK1E6XaRpxlJLkb4d4VLO4cE8K/S2FQmlQJAZKEPrFV0G70NYXsXA82w5qcZHYCv
|8UFI2Bq2iBSgLHrFdtQPDh96KrJuNwSrOUVzukaoD42CXyIUBc+io/N8gwJAJh4dHKGYK+
|TbOOhXbmtzGYhhOvp0SjaLR2hdUOsm4+p9m05lqa97q0sudlE9qNARq6PWqMAnNh1UC6qn
|0W2N+g==
|<CarlPrivRSASign.pri

***DianePrivDSSSign.pri***

|* Example DianePrivDSSSign.pri
|>DianePrivDSSSign.pri
|MIIBSwIBADCCASsGByqGSM44BAEwggEeAoGBALZJGD6KRMEpcZRMAcQSwXp5y1RNqx6B+8
|ZMsw6UCQbrAdSxyHFLx0XAUCVdnPza5G3T4oZIhIJ9uhWVShb2Ru3d9pjSu36KCoq6Fnu5
|UAFIk4vrJRVRl1Xcj1MOEKlQ/HC3zTBU/dreqKoitaGvi8wCiOeLcF+5reEI1G0pLdbpAh
|UA3cEv31POCzRgdz4CpL+KXZi5ENUCgYAM7lebS73atgdqdDdPVX+d7bxhDetGWTxWCytb
|DJHOpWJSacrhbT69v/7ht7krYTyty65F4wasjCKdnESHC8fN8BzZtU5dc96vDskdWlH1T0
|R5NVpzqn9GUR+pQhacSOuKeWG01S9TIkRjH4a4o1gGJfgpwO+64HXwQsRjZVKbCgQXAhUA
|lpX54MHgQS0yD4tCUpMq5h4OISk=
|<DianePrivDSSSign.pri

***DianePrivRSASignEncrypt.pri***

|* Example DianePrivRSASignEncrypt.pri
|>DianePrivRSASignEncrypt.pri
|MIICdwIBADANBgkqhkiG9w0BAQEFAASCAmEwggJdAgEAAoGBANb9uMBwxkwl7OrP6ny7om
|L68OYyOlP/sZJaF/Qg4ZkkggrQ9nz7RMqLJwbxfiYDqXadz+ygLHCW8oNC9tS3KAq7+L9K
|TBk/B9ugwWAet35n996xw2BJrEXX+MbvCDchk0fu8HM1crACxPMRw15H5Qq3g/HbdGlki0
|QdlV3NKMCFAgMBAAECgYA9vc3CDmEUW0vnv2AjBCvFazWllkUj/Gl9kzwP0yWWumJSQuKW
|z/5YgI/rsYy91A1l0Dp3RSSeDOuGgMOsIRFxROOyqKkurBfSo4QlY7W8Lx7d9iH/FSAkW/
|GAL9VBDjIk99RKMp65SdgZjj85jWK9gPwMJJKT5MPXBZFTu5a2QQJBAPO4P0rRlLCRYBNB
|kg2NRD93Hf+WI0QI1AtwyRqv6ZCU8rDVX08ZhVChkJGuvQV2UrMi2Kh8jlR/AHJPNnVoc7
```

```
|UCQQDh0ucRVwaucpUiFqoCtFrtTp2CEU+WPIbJEI1WezF1eWnndWg4AEsu0iYy3bHi4CxU
|gAp1utFmlhuwDqB+0ruRAkEAr7a82yJzQ0HstLVnqaGZ/O/Sjv0d++Upi/4K39TIXlclCl
|0r1AmgVlvFsWL8IL4ILeMHtaHns//EwKVfrBJcqQJBALmYQfwIUB9zYIoBonxSiiBa6iyJ
|2aUZ3ZTGG8MlwIJR5O4rmhncc+3pHSfU+GwD3asdCHu1rH/pgpvxiYpx22ECQAEHIZdfem
|Co/VpcB9+o3vfisTR9/OuRvbBzdMjEvj9YRTAGkLOsacyz9z98rMe4G2WhFjk5sON0fc/N
|xaxsv+U=
|<DianePrivRSASignEncrypt.pri
```

From Section 2.3

AliceDSSSignByCarlNoInherit.cer

```
|* Example AliceDSSSignByCarlNoInherit.cer
|>AliceDSSSignByCarlNoInherit.cer
|MIIC3DCCApugAwIBAgICAMgwCQYHKoZIzjgEAzASMRAwDgYDVQQDEwdDYXJsRFNTMB4XDT
|k5MDgxNzAxMTA0OVoXDTM5MTIzMTIzNTk1OVowEzERMA8GA1UEAxMIQWxpY2VEU1MwggG2
|MIIBKwYHKoZIzjgEATCCAR4CgYEAgY3N7YPqCp45PsJIKKPkR5PdDteoDuxTxauECE//lO
|FzSH4M1vNESNH+n6+koYkv4dkwyDbeP5u/t0zcX2mK5HXQNwyRCJWb3qde+fz0ny/dQ6iL
|VPE/sAcIR01diMPDtbPjVQh11Tl2EMR4vf+dsISXN/LkURu15AmWXPN+W9sCFQDiR6YaRW
|a4E8baj7g3IStii/eTzQKBgCY40BSJMqo5+z5t2UtZakx2IzkEAjVc8ssaMMMeUF3dm1ni
|zaoFPVjAe6I2uG4Hr32KQiWn9HXPSgheSz6Q+G3qnMkhijt2FOnOLl2jB80jhbgvMAF8bU
|mJEYk2RL34yJVKU1a14vlz7BphNh8Rf8K97dFQ/5h0wtGBSmA5ujY5A4GEAAKBgFzjuVp1
|FJYLqXrd4z+p7Kxe3L23ExE0phaJKBEj2TSGZ3V1ExI9Q1tv5VG/+onyohs+JH09B41bY8
|i7RaWgSuOF1s4GgD/oI34a8iSrUxq4Jw0e7wi/ZhSAXGKsZfoVi/G7NNTSljf2YUeyxDKE
|8H5BQP1Gp2NOM/Kl4vTyg+W4o4GBMH8wDAYDVR0TAQH/BAIwADAOBgNVHQ8BAf8EBAMCBs
|AwHwYDVR0jBBgwFoAUcEQ+gi5vh95K03XjPSC8QyuT8R8wHQYDVR0OBBYEFL5sobPjwfft
|Q3CkzhMB4v3jl/7NMB8GA1UdEQQYMBaBFEFsaWNlRFNTQGV4YW1wbGUuY29tMAkGByqGSM
|44BAMDMAAwLQIUVQykGR9CK4lxIjONg2q1PWdrv0UCFQCfYVNSVAtcst3a53Yd4hBSW0Ne
|vQ==
|<AliceDSSSignByCarlNoInherit.cer
```

AliceRSASignByCarl.cer

```
|* Example AliceRSASignByCarl.cer
|>AliceRSASignByCarl.cer
|MIICLDCCAZWgAwIBAgIQRjRrx4AAVrwR024uxBCzsDANBgkqhkiG9w0BAQUFADASMRAwDg
|YDVQQDEwdDYXJsUlNBMB4XDTk5MDkxOTAxMDg0N1oXDTM5MTIzMTIzNTk1OVowEzERMA8G
|A1UEAxMIQWxpY2VSU0EwgZ8wDQYJKoZIhvcNAQEBBQADgY0AMIGJAoGBAOCJczmN2PX16I
|d2OX9OsAW7U4PeD7er3H3HdSkNBS5tEt+mhibU0m+qWCn8l+z6glEPMIC+sVCeRkTxLLvY
|Ms/GaG8H2bBgrL7uNAlqE/X3BQWT3166NVbZYf8Zf8mB5vhs6odAcO+sbSx0ny36VTq5mX
|cCpkhSjE7zVzhXdFdfAgMBAAGjgYEwfzAMBgNVHRMBAf8EAjAAMA4GA1UdDwEB/wQEAwIG
|wDAfBgNVHSMEGDAWgBTp4JAnrHggeprTTPJCN04irp44uzAdBgNVHQ4EFgQUd9K00bdMio
|qjzkWdzuw8oDrj/1AwHwYDVR0RBBgwFoEUQWxpY2VSU0FAZXhhbXBsZS5jb20wDQYJKoZI
|hvcNAQEFBQADgYEAPnBHqEjME1iPylFxa042GF0EfoCxjU3MyqOPzH1WyLzPbrMcWakgqg
|WBqE4lradwFHUv9ceb0Q7pY9Jkt8ZmbnMhVN/0uiVdfUnTlGsiNnRzuErsL2Tt0z3Sp0LF
|6DeKtNufZ+S9n/n+dO/q+e5jatg/SyUJtdgadq7rm9tJsCI=
|<AliceRSASignByCarl.cer
```

BobRSASignByCarl.cer

```
|* Example BobRSASignByCarl.cer
|>BobRSASignByCarl.cer
|MIICJzCCAZCgAwIBAgIQRjRrx4AAVrwR024uzV1x0DANBgkqhkiG9w0BAQUFADASMRAwDg
|YDVQQDEwdDYXJsUlNBMB4XDTk5MDkxOTAxMDkwMloXDTM5MTIzMTIzNTk1OVowETEPMA0G
|A1UEAxMGQm9iUlNBMIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQCp4WeYPznVX/Kgk0
|FepnmJhcg1XZqRW/sdAdoZcCYXD72lItA1hW16mGYUQVzPt7cIOwnJkbgZaTdt+WUee9mp
|MySjfzu7r0YBhjY0MssHA1lS/IWLMQS4zBgIFEjmTxz7XWDE4FwfU9N/U9hpAfEF+Hpw0b
|6Dxl84zxwsqmqn6wIDAQABo38wfTAMBgNVHRMBAf8EAjAAMA4GA1UdDwEB/wQEAwIFIDAf
|BgNVHSMEGDAWgBTp4JAnrHggeprTTPJCN04irp44uzAdBgNVHQ4EFgQU6PS4Z9izlqQq8x
|GqKdOVWoYWtCQwHQYDVR0RBBYwFIESQm9iUlNBQGV4YW1wbGUuY29tMA0GCSqGSIb3DQEB
|BQUAA4GBAHuOZsXxED8QIEyIcat7QGshM/pKld6dDltrlCEFwPLhfirNnJOIh/uLt359QW
|Hh5NZt+eIEVWFFvGQnRMChvVl52R1kPCHWRbBdaDOS6qzxV+WBfZjmNZGjOd539OgcOync
|f1EHl/M28FAK3Zvetl44ESv7V+qJba3JiNiPzyvT
|<BobRSASignByCarl.cer
```

CarlDSSSelf.cer

```
|* Example CarlDSSSelf.cer
|>CarlDSSSelf.cer
|MIICmzCCAlqgAwIBAgIBATAJBgcqhkjOOAQDMBIxEDAOBgNVBAMTB0NhcmxEU1MwHhcNOT
|kwODE2MjI1MDUwWhcNMzkxMjMxMjM1OTU5WjASMRAwDgYDVQQDEwdDYXJsRFNTMIIBtzCC
|ASsGByqGSM44BAEwggEeAoGBALZJGD6KRMEpcZRMAcQSwXp5y1RNqx6B+8ZMsw6UCQbrAd
|SxyHFLx0XAUCVdnPza5G3T4oZIhIJ9uhWVShb2Ru3d9pjSu36KCoq6Fnu5UAFIk4vrJRVR
|l1Xcj1MOEKlQ/HC3zTBU/dreqKoitaGvi8wCiOeLcF+5reEI1G0pLdbpAhUA3cEv31POCz
|Rgdz4CpL+KXZi5ENUCgYAM7lebS73atgdqdDdPVX+d7bxhDetGWTxWCytbDJHOpWJSacrh
|bT69v/7ht7krYTyty65F4wasjCKdnESHC8fN8BzZtU5dc96vDskdWlH1T0R5NVpzqn9GUR
|+pQhacSOuKeWG01S9TIkRjH4a4o1gGJfgpwO+64HXwQsRjZVKbCgOBhQACgYEAmYd0JwNm
|oLHArdwsdbvhbESc2iFtTUdtsWIJ6diuHvI6tJSxo456m3FOAJTJtCVOuWCWGSQB82IM/n
|XA+87YaADj/dVwT98jlhkGlPSxYY86V7EIEaQLJiXwUnaB6gtiDZUq5oa6crKnUIMLqifN
|G6lNiZrXjRg5hD+LxVZNgHqjQjBAMA8GA1UdEwEB/wQFMAMBAf8wDgYDVR0PAQH/BAQDAg
|GGMB0GA1UdDgQWBBRwRD6CLm+H3krTdeM9ILxDK5PxHzAJBgcqhkjOOAQDAzAAMC0CFGup
|8E56Wnnj+b49K8kGN+kRF6ETAhUAjzRpKouxPAN5lDJNEh/OiftGsjs=
|<CarlDSSSelf.cer
```

CarlRSASelf.cer

```
|* Example CarlRSASelf.cer
|>CarlRSASelf.cer
|MIIB6zCCAVSgAwIBAgIQRjRrx4AAVrwR024un/JQIDANBgkqhkiG9w0BAQUFADASMRAwDg
|YDVQQDEwdDYXJsUlNBMB4XDTk5MDgxODA3MDAwMFoXDTM5MTIzMTIzNTk1OVowEjEQMA4G
|A1UEAxMHQ2FybFJTQTCBnzANBgkqhkiG9w0BAQEFAAOBjQAwgYkCgYEA5Ev/GLgkV/R3/2
|5ze5NxXLwzGpKSciPYQUbQzRE6BLOOr4KdvVEeF3rydiwrhjmnvdeNGlPs5ADV6OyiNrHt
|4lDiMgmKP5+ZJY+4Tqu5fdWWZdoWoMW+Dq5EW+9e9Kcpy4LdrETpqpOUKQ74GNbIV17yds
|TyEWA4uRs8HZfJavECAwEAAaNCMEAwDwYDVR0TAQH/BAUwAwEB/zAOBgNVHQ8BAf8EBAMC
|AYYwHQYDVR0OBBYEFOngkCeseCB6mtNM8kI3TiKunji7MA0GCSqGSIb3DQEBBQUAA4GBAL
|ee1ATT7Snk/4mJFS5M2wzwSA8yYe7EBOwSXS3/D2RZfgrD7Rj941ZAN6cHtfA4EmFQ7e/d
```

```
|P+MLuGGlpJs85p6cVJq2ldbabDu1LUU1nUkBdvq5uTH5+WsSU6D1FGCbfco+8lNrsDdvre
|Z019v6WuoUQWNdzb7IDsHaao1TNBgC
|<CarlRSASelf.cer

***DianeDSSSignByCarlInherit.cer***

|* Example DianeDSSSignByCarlInherit.cer
|>DianeDSSSignByCarlInherit.cer
|MIIBuDCCAXegAwIBAgICANIwCQYHKoZIzjgEAzASMRAwDgYDVQQDEwdDYXJsRFNTMB4XDT
|k5MDgxNzAyMDgxMFoXDTM5MTIzMTIzNTk1OVowEzERMA8GA1UEAxMIRGlhbmVEU1MwgZMw
|CQYHKoZIzjgEAQOBhQACgYEAoAAXeCzufoFTLi5hCA+hm1FSGtpZqHMvEiW2CMvK7ypEdo
|pSCeq9BSLVD/b9RtevmTgJDhPLTyzdHDT3HL8l/yPTO1nngpc3vjEk2BjI80k5W7fi5Sd+
|/IxFclt+Po9oTd1GeiK+jv/M2jkpoznln0PpVcnXW6aBZ8zAqs0uxSOjgYEwfzAMBgNVHR
|MBAf8EAjAAMA4GA1UdDwEB/wQEAwIGwDAfBgNVHSMEGDAWgBRwRD6CLm+H3krTdeM9ILxD
|K5PxHzAdBgNVHQ4EFgQUZDCZfVzcRQuZOlIvFr9YUN3OKxgwHwYDVR0RBBgwFoEURGlhbm
|VEU1NAZXhhbXBsZS5jb20wCQYHKoZIzjgEAwMwADAtAhUAoRr4Fw4+XaiM9LZVMx5L4yys
|uV8CFChLEEVY0hydVTUUGJGyPznftW7T
|<DianeDSSSignByCarlInherit.cer

***DianeRSASignByCarl.cer***

|* Example DianeRSASignByCarl.cer
|>DianeRSASignByCarl.cer
|MIICLDCCAZWgAwIBAgIQRjRrx4AAVrwR024u1ZowkDANBgkqhkiG9w0BAQUFADASMRAwDg
|YDVQQDEwdDYXJsUlNBMB4XDTk5MDgxOTA3MDAwMFoXDTM5MTIzMTIzNTk1OVowEzERMA8G
|A1UEAxMIRGlhbmVSU0EwgZ8wDQYJKoZIhvcNAQEBBQADgY0AMIGJAoGBANb9uMBwxkwl7O
|rP6ny7omL68OYyOlP/sZJaF/Qg4ZkkggrQ9nz7RMqLJwbxfiYDqXadz+ygLHCW8oNC9tS3
|KAq7+L9KTBk/B9ugwWAet35n996xw2BJrEXX+MbvCDchk0fu8HM1crACxPMRw15H5Qq3g/
|HbdGlki0QdlV3NKMCFAgMBAAGjgYEwfzAMBgNVHRMBAf8EAjAAMA4GA1UdDwEB/wQEAwIF
|4DAfBgNVHSMEGDAWgBTp4JAnrHggeprTTPJCN04irp44uzAdBgNVHQ4EFgQUjPPLdQ6NMf
|bUKdpEknW4/u1POQwwHwYDVR0RBBgwFoEURGlhbmVSU0FAZXhhbXBsZS5jb20wDQYJKoZI
|hvcNAQEFBQADgYEAfaYstXhC1nnzMf72QsoPEweSCRvgb7CRGPa/SvvMY3n7gb/dl8eQa8
|sKNytBagOYxRs+MshFK4YBnBziNu8WwRqSuL5i+1M+SUcLxLnkK1imBoPwsqe7hX7VxtrO
|nHsxctei6kGrasDdH7kURBjPhFdm6MXmuNwtsx8bKEM2dXo=
|<DianeRSASignByCarl.cer
```

From Section 2.4

```
***CarlDSSCRLForAll.crl***

|* Example CarlDSSCRLForAll.crl
|>CarlDSSCRLForAll.crl
|MIHYMIGZMAkGByqGSM44BAMwEjEQMA4GA1UEAxMHQ2FybERTUxcNOTkwODI3MDcwMDAwWj
|BpMBMCAgDIFw05OTA4MjIwNzAwMDBaMBMCAgDJFw05OTA4MjIwNzAwMDBaMBMCAgDTFw05
|OTA4MjIwNzAwMDBaMBMCAgDSFw05OTA4MjIwNzAwMDBaMBMCAgDUFw05OTA4MjQwNzAwMD
|BaMAkGByqGSM44BAMDLwAwLAIUfmVSdjP+NHMX0feW+aDU2G1cfT0CFAJ6W7fVWxjBz4fv
|ftok8yqDnDWh
|<CarlDSSCRLForAll.crl
```

```
***CarlDSSCRLForCarl.crl***

|* Example CarlDSSCRLForCarl.crl
|>CarlDSSCRLForCarl.crl
|MIGDMEQwCQYHKoZIzjgEAzASMRAwDgYDVQQDEwdDYXJsRFNTFw05OTA4MjUwNzAwMDBaMB
|QwEgIBARcNOTkwODIyMDcwMDAwWjAJBgcqhkjOOAQDAzAAMC0CFQCzH8VPej3sdtVg+d55
|IuxPsJD+lwIUWovDhLxmhxu/eYJbCl0H9rqpBSk=
|<CarlDSSCRLForCarl.crl

***CarlDSSCRLEmpty.crl***

|* Example CarlDSSCRLEmpty.crl
|>CarlDSSCRLEmpty.crl
|MG0wLjAJBgcqhkjOOAQDMBIxEDAOBgNVBAMTB0NhcmxEU1MXDTk5MDgyMDA3MDAwMFowCQ
|YHKoZIzjgEAwMwADAtAhRiPzYXMVguZ1B59QlLjK3Ua/RknwIVALU7TqFMe/0Pw42btv7D
|XW/eZSh9
|<CarlDSSCRLEmpty.crl

***CarlRSACRLForAll.crl***

|* Example CarlRSACRLForAll.crl
|>CarlRSACRLForAll.crl
|MIIBMzCBnTANBgkqhkiG9w0BAQQFADASMRAwDgYDVQQDEwdDYXJsUlNBFw05OTA4MjcwNz
|AwMDBaMGkwIQIQRjRrx4AAVrwR024uxBCzsBcNOTkwODIyMDcwMDAwWjAhAhBGNGvHgABW
|vBHTbi7VmjCQFw05OTA4MjIwNzAwMDBaMCECEEY0a8eAAFa8EdNuLs1dcdAXDTk5MDgyND
|A3MDAwMFowDQYJKoZIhvcNAQEEBQADgYEAv7OXqlPwMiEWK3eSemu7l8jc6vH6ZhYwDrWe
|XPCB1F6zbsGIa4zUXsVN+0deZvNdq+W0GDZgqE2cPInsbye/NVBxgcK5RFtiiRkSMal7mt
|PMZssR2QsQR3etTyLZ5X8w8lv8lFGlWHY7H6hGph/2od5Voe0xiGmXDwjT1AxgWx4=
|<CarlRSACRLForAll.crl

***CarlRSACRLForCarl.crl***

|* Example CarlRSACRLForCarl.crl
|>CarlRSACRLForCarl.crl
|MIHsMFcwDQYJKoZIhvcNAQEEBQAwEjEQMA4GA1UEAxMHQ2FybFJTQRcNOTkwODI1MDcwMD
|AwWjAjMCECEEY0a8eAAFa8EdNuLp/yUCAXDTk5MDgyMjA3MDAwMFowDQYJKoZIhvcNAQEE
|BQADgYEAIe8h1MEahZVJa8pFYtzXCf+pUS6O2UcY+vjlct1P7XR04/NlMmUoLJodV+XVJg
|bq1eYjlYSNDome7psML84H96PRa4VMD//m3fzczXMsHn3csHHFTPwBblJXaR45Y98SIjDH
|E1WUBW4qAKlbxCpmlGLONjPCK2NHJZ3z3nDuAFY=
|<CarlRSACRLForCarl.crl

***CarlRSACRLEmpty.crl***

|* Example CarlRSACRLEmpty.crl
|>CarlRSACRLEmpty.crl
|MIHHMDIwDQYJKoZIhvcNAQEEBQAwEjEQMA4GA1UEAxMHQ2FybFJTQRcNOTkwODIwMDcwMD
|AwWjANBgkqhkiG9w0BAQQFAAOBgQCpxSG4E3x087UR7ATzIEWGHgtuf4NtX/Q0dgZZJQ4E
|PYgJiIE3xNwgmPoXgQs3lKy0j3tRiRSky3JzFAe8IpxAoQf8RHyFDwuI0e7hDq/2FnStoa
```

```
|/BAHUAZOqlmvYLCKLblRlfpqe5OUUlCg72XoTn+LlayRjCDriglr6BOoBtyQ==
|<CarlRSACRLEmpty.crl

Rest of the sections

***3.1.bin***

|* Example 3.1.bin
|>3.1.bin
|MIAGCSqGSIb3DQEHAaCAJIAEBFRoaXMEGCBpcyBzb21lIHNhbXBsZSBjb250ZW50LgAAAA
|AAAA==
|<3.1.bin

***3.2.bin***

|* Example 3.2.bin
|>3.2.bin
|MCsGCSqGSIb3DQEHAaAeBBxUaGlzIGlzIHNvbWUgc2FtcGxlIGNvbnRlbnQu
|<3.2.bin

***4.1.bin***

|* Example 4.1.bin
|>4.1.bin
|MIIDlwYJKoZIhvcNAQcCoIIDiDCCA4QCAQExCTAHBgUrDgMCGjArBgkqhkiG9w0BBwGgHg
|QcVGhpcyBpcyBzb21lIHNhbXBsZSBjb250ZW50LqCCAuAwggLcMIICm6ADAgECAgIAyDAJ
|BgcqhkjOOAQDMBIxEDAOBgNVBAMTB0NhcmxEU1MwHhcNOTkwODE3MDExMDQ5WhcNMzkxMj
|MxMjM1OTU5WjATMREwDwYDVQQDEwhBbGljZURTUzCCAbYwggErBgcqhkjOOAQBMIIBHgKB
|gQCBjc3tg+oKnjk+wkgoo+RHk90O16gO7FPFq4QIT/+U4XNIfgzW80RI0f6fr6ShiS/h2T
|DINt4/m7+3TNxfaYrkddA3DJEIlZvep175/PSfL91DqItU8T+wBwhHTV2Iw8O1s+NVCHXV
|OXYQxHi9/52whJc38uRRG7XkCZZc835b2wIVAOJHphpFZrgTxtqPuDchK2KL95PNAoGAJj
|jQFIkyqjn7Pm3ZS1lqTHYjOQQCNVzyyxowwx5QXd2bWeLNqgU9WMB7oja4bgevfYpCJaf0
|dc9KCF5LPpD4beqcySGKO3YU6c4uXaMHzSOFuC8wAXxtSYkRiTZEvfjIlUpTVrXi+XPsGm
|E2HxF/wr3t0VD/mHTC0YFKYDm6NjkDgYQAAoGAXOO5WnUUlgupet3jP6nsrF7cvbcTETSm
|FokoESPZNIZndXUTEj1DW2/lUb/6ifKiGz4kfT0HjVtjyLtFpaBK44XWzgaAP+gjfhryJK
|tTGrgnDR7vCL9mFIBcYqxl+hWL8bs01NKWN/ZhR7LEMoTwfkFA/UanY04z8qXi9PKD5bij
|gYEwfzAMBgNVHRMBAf8EAjAAMA4GA1UdDwEB/wQEAwIGwDAfBgNVHSMEGDAWgBRwRD6CLm
|+H3krTdeM9ILxDK5PxHzAdBgNVHQ4EFgQUvmyhs+PB9+1DcKTOEwHi/eOX/s0wHwYDVR0R
|BBgwFoEUQWxpY2VEU1NAZXhhbXBsZS5jb20wCQYHKoZIzjgEAwMwADAtAhRVDKQZH0IriX
|EiM42DarU9Z2u/RQIVAJ9hU1JUC1yy3drndh3iEFJbQ169MWMwYQIBATAYMBIxEDAOBgNV
|BAMTB0NhcmxEU1MCAgDIMAcGBSsOAwIaMAkGByqGSM44BAMELjAsAhQJkf7r0mn1GLfXzV
|X0geoqQmqtAwIUOgfMwyG+4RpLfz61Ddu6HOq8zYk=
|<4.1.bin
```

4.2.bin

```
|* Example 4.2.bin
|>4.2.bin
|MIIDUgYJKoZIhvcNAQcCoIIDQzCCAz8CAQExCzAJBgUrDgMCGgUAMCsGCSqGSIb3DQEHAa
|AeBBxUaGlzIGlzIHNvbWUgc2FtcGxlIGNvbnRlbnQuoIICMDCCAiwwggGVoAMCAQICEEY0
|a8eAAFa8EdNuLsQQs7AwDQYJKoZIhvcNAQEFBQAwEjEQMA4GA1UEAxMHQ2FybFJTQTAeFw
|05OTA5MTkwMTA4NDdaFw0zOTEyMzEyMzU5NTlaMBMxETAPBgNVBAMTCEFsaWNlUlNBMIGf
|MA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQDgiXM5jdj19eiHdjl/TrAFu1OD3g+3q9x9x3
|UpDQUubRLfpoYm1NJvqlgp/Jfs+oJRDzCAvrFQnkZE8Sy72DLPxmhvB9mwYKy+7jQJahP1
|9wUFk99eujVW2WH/GX/Jgeb4bOqHQHDvrG0sdJ8t+lU6uZl3AqZIUoxO81c4V3RXXwIDAQ
|ABo4GBMH8wDAYDVR0TAQH/BAIwADAOBgNVHQ8BAf8EBAMCBsAwHwYDVR0jBBgwFoAU6eCQ
|J6x4IHqa00zyQjdOIq6eOLswHQYDVR0OBBYEFHfStNG3TIqKo85Fnc7sPKA64/9QMB8GA1
|UdEQQYMBaBFEFsaWNlUlNBQGV4YW1wbGUuY29tMA0GCSqGSIb3DQEBBQUAA4GBAD5wR6hI
|zBNYj8pRcWtONhhdBH6AsY1NzMqjj8x9Vsi8z26zHFmpIKoFgahOJa2ncBR1L/XHm9EO6W
|PSZLfGZm5zIVTf9LolXX1J05RrIjZ0c7hK7C9k7dM90qdCxeg3irTbn2fkvZ/5/nTv6vnu
|Y2rYP0slCbXYGnau65vbSbAiMYHLMIHIAgEBMCYwEjEQMA4GA1UEAxMHQ2FybFJTQQIQRj
|Rrx4AAVrwR024uxBCzsDAJBgUrDgMCGgUAMA0GCSqGSIb3DQEBAQUABIGALyOC0vMJX7gM
|WOtOnb+JmoHldcSRPdPQ1Xu21f6UoYqs48SE9c1gTieV9s8AhnZ1Pyvw59QCZ6f1x40WBK
|WztefZMvAk7+cgRNWfB8VTJPrOAR0PFxOnKpWdK+QDlRQL6TkNus5unJ4M6JjmVRPUaG/Q
|B9eisWJM44+v/eDVXcc=
|<4.2.bin
```

4.3.bin

```
|* Example 4.3.bin
|>4.3.bin
|MIIDdwYJKoZIhvcNAQcCoIIDaDCCA2QCAQExCTAHBgUrDgMCGjALBgkqhkiG9w0BBwGggg
|LgMIIC3DCCApugAwIBAgICAMgwCQYHKoZIzjgEAzASMRAwDgYDVQQDEwdDYXJsRFNTMB4X
|DTk5MDgxNzAxMTA0OVoXDTM5MTIzMTIzNTk1OVowEzERMA8GA1UEAxMIQWxpY2VEU1Mwgg
|G2MIIBKwYHKoZIzjgEATCCAR4CgYEAgY3N7YPqCp45PsJIKKPkR5PdDteoDuxTxauECE//
|lOFzSH4M1vNESNH+n6+koYkv4dkwyDbeP5u/t0zcX2mK5HXQNwyRCJWb3qde+fz0ny/dQ6
|iLVPE/sAcIR01diMPDtbPjVQh11Tl2EMR4vf+dsISXN/LkURu15AmWXPN+W9sCFQDiR6Ya
|RWa4E8baj7g3IStii/eTzQKBgCY40BSJMqo5+z5t2UtZakx2IzkEAjVc8ssaMMMeUF3dm1
|nizaoFPVjAe6I2uG4Hr32KQiWn9HXPSgheSz6Q+G3qnMkhijt2FOnOLl2jB80jhbgvMAF8
|bUmJEYk2RL34yJVKU1a14vlz7BphNh8Rf8K97dFQ/5h0wtGBSmA5ujY5A4GEAAKBgFzjuV
|p1FJYLqXrd4z+p7Kxe3L23ExE0phaJKBEj2TSGZ3V1ExI9Q1tv5VG/+onyohs+JH09B41b
|Y8i7RaWgSuOF1s4GgD/oI34a8iSrUxq4Jw0e7wi/ZhSAXGKsZfoVi/G7NNTSljf2YUeyxD
|KE8H5BQP1Gp2NOM/Kl4vTyg+W4o4GBMH8wDAYDVR0TAQH/BAIwADAOBgNVHQ8BAf8EBAMC
|BsAwHwYDVR0jBBgwFoAUcEQ+gi5vh95K03XjPSC8QyuT8R8wHQYDVR0OBBYEFL5sobPjwf
|ftQ3CkzhMB4v3jl/7NMB8GA1UdEQQYMBaBFEFsaWNlRFNTQGV4YW1wbGUuY29tMAkGByqG
|SM44BAMDMAAwLQIUVQykGR9CK4lxIjONg2q1PWdrv0UCFQCfYVNSVAtcst3a53Yd4hBSW0
|NevTFjMGECAQEwGDASMRAwDgYDVQQDEwdDYXJsRFNTAgIAyDAHBgUrDgMCGjAJBgcqhkjO
|OAQDBC4wLAIUBvvHKiTVNIn3i7X9cySlhsgPWmwCFGZpGbxoWNGNsZ1SP9oUiA39yaG4
|<4.3.bin
```

4.4.bin

```
|* Example 4.4.bin
|>4.4.bin
|MIILDQYJKoZIhvcNAQcCoIIK/jCCCvoCAQExCTAHBgUrDgMCGjArBgkqhkiG9w0BBwGgHg
|QcVGhpcyBpcyBzb21lIHNhbXBsZSBjb250ZW50LqCCB68wggIsMIIBlaADAgECAhBGNGvH
|gABWvBHTbi7EELOwMA0GCSqGSIb3DQEBBQUAMBIxEDAOBgNVBAMTB0NhcmxSU0EwHhcNOT
|kwOTE5MDEwODQ3WhcNMzkxMjMxMjM1OTU5WjATMREwDwYDVQQDEwhBbGljZVJTQTCBnzAN
|BgkqhkiG9w0BAQEFAAOBjQAwgYkCgYEA4IlzOY3Y9fXoh3Y5f06wBbtTg94Pt6vcfcd1KQ
|0FLm0S36aGJtTSb6pYKfyX7PqCUQ8wgL6xUJ5GRPEsu9gyz8ZobwfZsGCsvu40CWoT9fcF
|BZPfXro1Vtlh/xl/yYHm+Gzqh0Bw76xtLHSfLfpVOrmZdwKmSFKMTvNXOFd0V18CAwEAAa
|OBgTB/MAwGA1UdEwEB/wQCMAAwDgYDVR0PAQH/BAQDAgbAMB8GA1UdIwQYMBaAFOngkCes
|eCB6mtNM8kI3TiKunji7MB0GA1UdDgQWBBR30rTRt0yKiqPORZ3O7DygOuP/UDAfBgNVHR
|EEGDAWgRRBbGljZVJTQUBleGFtcGxlLmNvbTANBgkqhkiG9w0BAQUFAAOBgQA+cEeoSMwT
|WI/KUXFrTjYYXQR+gLGNTczKo4/MfVbIvM9usxxZqSCqBYGoTiWtp3AUdS/1x5vRDulj0m
|S3xmZucyFU3/S6JV19SdOUayI2dHO4SuwvZO3TPdKnQsXoN4q0259n5L2f+f507+r57mNq
|2D9LJQm12Bp2ruub20mwIjCCApswggJaoAMCAQICAQEwCQYHKoZIzjgEAzASMRAwDgYDVQ
|QDEwdDYXJsRFNTMB4XDTk5MDgxNjIyNTA1MFoXDTM5MTIzMTIzNTk1OVowEjEQMA4GA1UE
|AxMHQ2FybERTUzCCAbcwggErBgcqhkjOOAQBMIIBHgKBgQC2SRg+ikTBKXGUTAHEEsF6ec
|tUTasegfvGTLMOlAkG6wHUschxS8dFwFAlXZz82uRt0+KGSISCfboVlUoW9kbt3faY0rt+
|igqKuhZ7uVABSJOL6yUVUZdV3I9TDhCpUPxwt80wVP3a3qiqIrWhr4vMAojni3Bfua3hCN
|RtKS3W6QIVAN3BL99Tzgs0YHc+AqS/il2YuRDVAoGADO5Xm0u92rYHanQ3T1V/ne28YQ3r
|Rlk8VgsrWwyRzqViUmnK4W0+vb/+4be5K2E8rcuuReMGrIwinZxEhwvHzfAc2bVOXXPerw
|7JHVpR9U9EeTVac6p/RlEfqUIWnEjrinlhtNUvUyJEYx+GuKNYBiX4KcDvuuB18ELEY2VS
|mwoDgYUAAoGBAJmHdCcDZqCxwK3cLHW74WxEnNohbU1HbbFiCenYrh7yOrSUsaOOeptxTg
|CUybQlTrlglhkkAfNiDP51wPvO2GgA4/3VcE/fI5YZBpT0sWGPOlexCBGkCyYl8FJ2geoL
|Yg2VKuaGunKyp1CDC6onzRupTYma140YOYQ/i8VWTYB6o0IwQDAPBgNVHRMBAf8EBTADAQ
|H/MA4GA1UdDwEB/wQEAwIBhjAdBgNVHQ4EFgQUcEQ+gi5vh95K03XjPSC8QyuT8R8wCQYH
|KoZIzjgEAwMwADAtAhRrqfBOelp54/m+PSvJBjfpERehEwIVAI80aSqLsTwDeZQyTRIfzo
|n7RrI7MIIC3DCCApugAwIBAgICAMgwCQYHKoZIzjgEAzASMRAwDgYDVQQDEwdDYXJsRFNT
|MB4XDTk5MDgxNzAxMTA0OVoXDTM5MTIzMTIzNTk1OVowEzERMA8GA1UEAxMIQWxpY2VEU1
|MwggG2MIIBKwYHKoZIzjgEATCCAR4CgYEAgY3N7YPqCp45PsJIKKPkR5PdDteoDuxTxauE
|CE//lOFzSH4M1vNESNH+n6+koYkv4dkwyDbeP5u/t0zcX2mK5HXQNwyRCJWb3qde+fz0ny
|/dQ6iLVPE/sAcIR01diMPDtbPjVQh11Tl2EMR4vf+dsISXN/LkURu15AmWXPN+W9sCFQDi
|R6YaRWa4E8baj7g3IStii/eTzQKBgCY40BSJMqo5+z5t2UtZakx2IzkEAjVc8ssaMMMeUF
|3dm1nizaoFPVjAe6I2uG4Hr32KQiWn9HXPSgheSz6Q+G3qnMkhijt2FOnOLl2jB80jhbgv
|MAF8bUmJEYk2RL34yJVKU1a14vlz7BphNh8Rf8K97dFQ/5h0wtGBSmA5ujY5A4GEAAKBgF
|zjuVp1FJYLqXrd4z+p7Kxe3L23ExE0phaJKBEj2TSGZ3V1ExI9Q1tv5VG/+onyohs+JH09
|B41bY8i7RaWgSuOF1s4GgD/oI34a8iSrUxq4Jw0e7wi/ZhSAXGKsZfoVi/G7NNTSljf2YU
|eyxDKE8H5BQP1Gp2NOM/Kl4vTyg+W4o4GBMH8wDAYDVR0TAQH/BAIwADAOBgNVHQ8BAf8E
|BAMCBsAwHwYDVR0jBBgwFoAUcEQ+gi5vh95K03XjPSC8QyuT8R8wHQYDVR0OBBYEFL5sob
|PjwfftQ3CkzhMB4v3jl/7NMB8GA1UdEQQYMBaBFEFsaWNlRFNTQGV4YW1wbGUuY29tMAkG
|ByqGSM44BAMDMAAwLQIUVQykGR9CK4lxIjONg2q1PWdrv0UCFQCfYVNSVAtcst3a53Yd4h
|BSW0NevaGB2zCB2DCBmTAJBgcqhkjOOAQDMBIxEDAOBgNVBAMTB0NhcmxEU1MXDTk5MDgy
|NzA3MDAwMFowaTATAgIAyBcNOTkwODIyMDcwMDAwWjATAgIAyRcNOTkwODIyMDcwMDAwWj
|ATAgIA0xcNOTkwODIyMDcwMDAwWjATAgIA0hcNOTkwODIyMDcwMDAwWjATAgIA1BcNOTkw
|ODI0MDcwMDAwWjAJBgcqhkjOOAQDAy8AMCwCFH5lUnYz/jRzF9H3lvmg1NhtXH09AhQCel
|u31VsYwc+H737aJPMqg5w1oTGCAiowggImAgEBMBgwEjEQMA4GA1UEAxMHQ2FybERTUwIC
```

```
|AMgwBwYFKw4DAhqgXTAYBgkqhkiG9w0BCQMxCwYJKoZIhvcNAQcBMBwGCSqGSIb3DQEJBT
|EPFw0wMzA1MTQxNTM5MDBaMCMGCSqGSIb3DQEJBDEWBBRAauwIUnm6bhYCLZ4GKcAilofd
|SDAJBgcqhkjOOAQDBC4wLAIUO6XgStttWOAZ0QAcT0SaV3pxZmgCFBoRmNYfH680gQHevo
|vctqhqkWkToYIBYjA+BgsqhkiG9w0BCRACBDEvMC0MIENvbnRlbnQgSGludHMgRGVzY3Jp
|cHRpb24gQnVmZmVyBgkqhkiG9w0BBwEwggEeBgkqhkiG9w0BCQYxggEPMIIBCwIBATAmMB
|IxEDAOBgNVBAMTB0NhcmxSU0ECEEY0a8eAAFa8EdNuLsQQs7AwBwYFKw4DAhqgQzAcBgkq
|hkiG9w0BCQUxDxcNMDMwNTE0MTUzOTAwWjAjBgkqhkiG9w0BCQQxFgQUAl9JTjmYUIWzZt
|OKH3ueaar72DMwDQYJKoZIhvcNAQEBBQAEgYBtqiAk7XrupV6H3XUfK1QQZfTOm7EseHS8
|ixxgtduLA55J8it/k249iRTJ42v09n12rj5YH5u7vHwwGU4Q9wLxi1u025q7k7QY0MwryZ
|GprdlG+GWp4nGV0NROH810b4LoN29aPcvH1F/CgBva04RAaF9WmmL1Ow1sM8PtZz9Dvw==
|<4.4.bin
```

4.5.bin

```
|* Example 4.5.bin
|>4.5.bin
|MIAGCSqGSIb3DQEHAqCAMIACAQExCzAJBgUrDgMCGgUAMIAGCSqGSIb3DQEHAaCAJIAEBF
|RoaXMEGCBpcyBzb21lIHNhbXBsZSBjb250ZW50LgAAAAAAAKCAMIIB6zCCAVSgAwIBAgIQ
|RjRrx4AAVrwR024un/JQIDANBgkqhkiG9w0BAQUFADASMRAwDgYDVQQDEwdDYXJsUlNBMB
|4XDTk5MDgxODA3MDAwMFoXDTM5MTIzMTIzNTk1OVowEjEQMA4GA1UEAxMHQ2FybFJTQTCB
|nzANBgkqhkiG9w0BAQEFAAOBjQAwgYkCgYEA5Ev/GLgkV/R3/25ze5NxXLwzGpKSciPYQU
|bQzRE6BLOOr4KdvVEeF3rydiwrhjmnvdeNGlPs5ADV6OyiNrHt4lDiMgmKP5+ZJY+4Tqu5
|fdWWZdoWoMW+Dq5EW+9e9Kcpy4LdrETpqpOUKQ74GNbIV17ydsTyEWA4uRs8HZfJavECAw
|EAAaNCMEAwDwYDVR0TAQH/BAUwAwEB/zAOBgNVHQ8BAf8EBAMCAYYwHQYDVR0OBBYEFOng
|kCeseCB6mtNM8kI3TiKunji7MA0GCSqGSIb3DQEBBQUAA4GBALee1ATT7Snk/4mJFS5M2w
|zwSA8yYe7EBOwSXS3/D2RZfgrD7Rj941ZAN6cHtfA4EmFQ7e/dP+MLuGGlpJs85p6cVJq2
|ldbabDu1LUU1nUkBdvq5uTH5+WsSU6D1FGCbfco+8lNrsDdvreZ019v6WuoUQWNdzb7IDs
|Haao1TNBgCMIICLDCCAZWgAwIBAgIQRjRrx4AAVrwR024uxBCzsDANBgkqhkiG9w0BAQUF
|ADASMRAwDgYDVQQDEwdDYXJsUlNBMB4XDTk5MDkxOTAxMDg0N1oXDTM5MTIzMTIzNTk1OV
|owEzERMA8GA1UEAxMIQWxpY2VSU0EwgZ8wDQYJKoZIhvcNAQEBBQADgY0AMIGJAoGBAOCJ
|czmN2PX16Id2OX9OsAW7U4PeD7er3H3HdSkNBS5tEt+mhibU0m+qWCn8l+z6glEPMIC+sV
|CeRkTxLLvYMs/GaG8H2bBgrL7uNAlqE/X3BQWT3166NVbZYf8Zf8mB5vhs6odAcO+sbSx0
|ny36VTq5mXcCpkhSjE7zVzhXdFdfAgMBAAGjgYEwfzAMBgNVHRMBAf8EAjAAMA4GA1UdDw
|EB/wQEAwIGwDAfBgNVHSMEGDAWgBTp4JAnrHggeprTTPJCN04irp44uzAdBgNVHQ4EFgQU
|d9K00bdMioqjzkWdzuw8oDrj/1AwHwYDVR0RBBgwFoEUQWxpY2VSU0FAZXhhbXBsZS5jb2
|0wDQYJKoZIhvcNAQEFBQADgYEAPnBHqEjME1iPylFxa042GF0EfoCxjU3MyqOPzH1WyLzP
|brMcWakgqgWBqE4lradwFHUv9ceb0Q7pY9Jkt8ZmbnMhVN/0uiVdfUnTlGsiNnRzuErsL2
|Tt0z3Sp0LF6DeKtNufZ+S9n/n+dO/q+e5jatg/SyUJtdgadq7rm9tJsCIAADGByzCByAIB
|ATAmMBIxEDAOBgNVBAMTB0NhcmxSU0ECEEY0a8eAAFa8EdNuLsQQs7AwCQYFKw4DAhoFAD
|ANBgkqhkiG9w0BAQEFAASBgC8jgtLzCV+4DFjrTp2/iZqB5XXEkT3T0NV7ttX+lKGKrOPE
|hPXNYE4nlfbPAIZ2dT8r8OfUAmen9ceNFgSls7Xn2TLwJO/nIETVnwfFUyT6zgEdDxcTpy
|qVnSvkA5UUC+k5DbrObpyeDOiY5lUT1Ghv0AfXorFiTOOPr/3g1V3HAAAAAAAA
|<4.5.bin
```

4.6.bin

```
|* Example 4.6.bin
|>4.6.bin
|MIIFtwYJKoZIhvcNAQcCoIIFqDCCBaQCAQExCTAHBgUrDgMCGjArBgkqhkiG9w0BBwGgHg
|QcVGhpcyBpcyBzb21lIHNhbXBsZSBjb250ZW50LqCCBJwwggG4MIIBd6ADAgECAgIA0jAJ
|BgcqhkjOOAQDMBIxEDAOBgNVBAMTB0NhcmxEU1MwHhcNOTkwODE3MDIwODEwWhcNMzkxMj
|MxMjM1OTU5WjATMREwDwYDVQQDEwhEaWFuZURTUzCBkzAJBgcqhkjOOAQBA4GFAAKBgQCg
|ABd4LO5+gVMuLmEID6GbUVIa2lmocy8SJbYIy8rvKkR2ilIJ6r0FItUP9v1G16+ZOAkOE8
|tPLN0cNPccvyX/I9M7WeeClze+MSTYGMjzSTlbt+LlJ378jEVyW34+j2hN3UZ6Ir6O/8za
|OSmjOeWfQ+lVyddbpoFnzMCqzS7FI6OBgTB/MAwGA1UdEwEB/wQCMAAwDgYDVR0PAQH/BA
|QDAgbAMB8GA1UdIwQYMBaAFHBEPoIub4feStN14z0gvEMrk/EfMB0GA1UdDgQWBBRkMJl9
|XNxFC5k6Ui8Wv1hQ3c4rGDAfBgNVHREEGDAWgRREaWFuZURTU0BleGFtcGxlLmNvbTAJBg
|cqhkjOOAQDAzAAMC0CFQChGvgXDj5dqIz0tlUzHkvjLKy5XwIUKEsQRVjSHJ1VNRQYkbI/
|Od+1btMwggLcMIICm6ADAgECAgIAyDAJBgcqhkjOOAQDMBIxEDAOBgNVBAMTB0NhcmxEU1
|MwHhcNOTkwODE3MDExMDQ5WhcNMzkxMjMxMjM1OTU5WjATMREwDwYDVQQDEwhBbGljZURT
|UzCCAbYwggErBgcqhkjOOAQBMIIBHgKBgQCBjc3tg+oKnjk+wkgoo+RHk90O16gO7FPFq4
|QIT/+U4XNIfgzW80RI0f6fr6ShiS/h2TDINt4/m7+3TNxfaYrkddA3DJEIlZvep175/PSf
|L91DqItU8T+wBwhHTV2Iw8O1s+NVCHXVOXYQxHi9/52whJc38uRRG7XkCZZc835b2wIVAO
|JHphpFZrgTxtqPuDchK2KL95PNAoGAJjjQFIkyqjn7Pm3ZS1lqTHYjOQQCNVzyyxowwx5Q
|Xd2bWeLNqgU9WMB7oja4bgevfYpCJaf0dc9KCF5LPpD4beqcySGKO3YU6c4uXaMHzSOFuC
|8wAXxtSYkRiTZEvfjIlUpTVrXi+XPsGmE2HxF/wr3t0VD/mHTC0YFKYDm6NjkDgYQAAoGA
|XOO5WnUUlgupet3jP6nsrF7cvbcTETSmFokoESPZNIZndXUTEj1DW2/lUb/6ifKiGz4kfT
|0HjVtjyLtFpaBK44XWzgaAP+gjfhryJKtTGrgnDR7vCL9mFIBcYqxl+hWL8bs01NKWN/Zh
|R7LEMoTwfkFA/UanY04z8qXi9PKD5bijgYEwfzAMBgNVHRMBAf8EAjAAMA4GA1UdDwEB/w
|QEAwIGwDAfBgNVHSMEGDAWgBRwRD6CLm+H3krTdeM9ILxDK5PxHzAdBgNVHQ4EFgQUvmyh
|s+PB9+1DcKTOEwHi/eOX/s0wHwYDVR0RBBgwFoEUQWxpY2VEU1NAZXhhbXBsZS5jb20wCQ
|YHKoZIzjgEAwMwADAtAhRVDKQZH0IriXEiM42DarU9Z2u/RQIVAJ9hU1JUC1yy3drndh3i
|EFJbQ169MYHGMGECAQEwGDASMRAwDgYDVQQDEwdDYXJsRFNTAgIAyDAHBgUrDgMCGjAJBg
|cqhkjOOAQDBC4wLAIUSCTei4XyFq/sgmGpVNAtBKHMWk8CFBft1XcC7nUT2BC9PZcXIIi7
|/XuBMGECAQEwGDASMRAwDgYDVQQDEwdDYXJsRFNTAgIA0jAHBgUrDgMCGjAJBgcqhkjOOA
|QDBC4wLAIUFf+BTYytgE6bNVgEN25jbulbg/oCFAZ+WE4rMYRB7Ul5OD530qaMdQgh
|<4.6.bin
```

4.7.bin

```
|* Example 4.7.bin
|>4.7.bin
|MIIDlAYJKoZIhvcNAQcCoIIDhTCCA4ECAQMxCTAHBgUrDgMCGjArBgkqhkiG9w0BBwGgHg
|QcVGhpcyBpcyBzb21lIHNhbXBsZSBjb250ZW50LqCCAuAwggLcMIICm6ADAgECAgIAyDAJ
|BgcqhkjOOAQDMBIxEDAOBgNVBAMTB0NhcmxEU1MwHhcNOTkwODE3MDExMDQ5WhcNMzkxMj
|MxMjM1OTU5WjATMREwDwYDVQQDEwhBbGljZURTUzCCAbYwggErBgcqhkjOOAQBMIIBHgKB
|gQCBjc3tg+oKnjk+wkgoo+RHk90O16gO7FPFq4QIT/+U4XNIfgzW80RI0f6fr6ShiS/h2T
|DINt4/m7+3TNxfaYrkddA3DJEIlZvep175/PSfL91DqItU8T+wBwhHTV2Iw8O1s+NVCHXV
|OXYQxHi9/52whJc38uRRG7XkCZZc835b2wIVAOJHphpFZrgTxtqPuDchK2KL95PNAoGAJj
|jQFIkyqjn7Pm3ZS1lqTHYjOQQCNVzyyxowwx5QXd2bWeLNqgU9WMB7oja4bgevfYpCJaf0
|dc9KCF5LPpD4beqcySGKO3YU6c4uXaMHzSOFuC8wAXxtSYkRiTZEvfjIlUpTVrXi+XPsGm
|E2HxF/wr3t0VD/mHTC0YFKYDm6NjkDgYQAAoGAXOO5WnUUlgupet3jP6nsrF7cvbcTETSm
```

```
|FokoESPZNIZndXUTEj1DW2/lUb/6ifKiGz4kfT0HjVtjyLtFpaBK44XWzgaAP+gjfhryJK
|tTGrgnDR7vCL9mFIBcYqxl+hWL8bs01NKWN/ZhR7LEMoTwfkFA/UanY04z8qXi9PKD5bij
|gYEwfzAMBgNVHRMBAf8EAjAAMA4GA1UdDwEB/wQEAwIGwDAfBgNVHSMEGDAWgBRwRD6CLm
|+H3krTdeM9ILxDK5PxHzAdBgNVHQ4EFgQUvmyhs+PB9+1DcKTOEwHi/eOX/s0wHwYDVR0R
|BBgwFoEUQWxpY2VEU1NAZXhhbXBsZS5jb20wCQYHKoZIzjgEAwMwADAtAhRVDKQZH0IriX
|EiM42DarU9Z2u/RQIVAJ9hU1JUC1yy3drndh3iEFJbQ169MWAwXgIBA4AUvmyhs+PB9+1D
|cKTOEwHi/eOX/s0wBwYFKw4DAhowCQYHKoZIzjgEAwQvMC0CFQCJw2t7VvfDEgBl8Tf1xF
|gXjRFXgwIUCw9DOqrs3nphLIyc9UGZpzwgw7c=
|<4.7.bin

***4.8.eml***

|* Example 4.8.eml
|>4.8.eml
|TUlNRS1WZXJzaW9uOiAxLjAKVG86IFVzZXIyQGV4YW1wbGVzLmNvbQpGcm9tOiBhbGljZU
|Rzc0BleGFtcGxlcy5jb20KU3ViamVjdDogRXhhbXBsZSA0LjgKTWVzc2FnZS1JZDogPDAy
|MDkwNjAwMjU1MDMwMC4yNDlAZXhhbXBsZXMuY29tPgpEYXRlOiBGcmksIDA2IFNlcCAyMD
|AyIDAwOjI1OjIxIC0wMzAwIApDb250ZW50LVR5cGU6IG11bHRpcGFydC9zaWduZWQ7CiAg
|ICBtaWNhbGc9U0hBMTsKICAgIGJvdW5kYXJ5PSItLS0tPV9OZXh0Qm91bmRyeV9fX19Gcm
|ksXzA2X1NlcF8yMDAyXzAwOjI1OjIxIjsKICAgIHByb3RvY29sPSJhcHBsaWNhdGlvbi9w
|a2NzNy1zaWduYXR1cmUiCgpUaGlzIGlzIGEgbXVsdGktcGFydCBtZXNzYWdlIGluIE1JTU
|UgZm9ybWF0LgoKLS0tLS0tPV9OZXh0Qm91bmRyeV9fX19GcmksXzA2X1NlcF8yMDAyXzAw
|OjI1OjIxCgpUaGlzIGlzIHNvbWUgc2FtcGxlIGNvbnRlbnQuCi0tLS0tLT1fTmV4dEJvdW
|5kcnlfX19fRnJpLF8wNl9TZXBfMjAwMl8wMDoyNToyMQpDb250ZW50LVR5cGU6IGFwcGxp
|Y2F0aW9uL3BrY3M3LXNpZ25hdHVyZTsgbmFtZT1zbWltZS5wN3MKQ29udGVudC1UcmFuc2
|Zlci1FbmNvZGluZzogYmFzZTY0CkNvbnRlbnQtRGlzcG9zaXRpb246IGF0dGFjaG1lbnQ7
|IGZpbGVuYW1lPXNtaW1lLnA3cwoKTUlJRGR3WUpLb1pJaHZjTkFRY0NvSUlEYURDQ0EyUU
|NBUUV4Q1RBSEJnVXJEZ01DR2pBTEJna3Foa2lHOXcwQkJ3R2dnZ0xnTUlJQwozRENDQXB1
|Z0F3SUJBZ0lDQU1nd0NRWUhLb1pJempnRUF6QVNNUkF3RGdZRFZRUURFd2REWVhKc1JGTl
|RNQjRYRFRrNU1EZ3hOekF4Ck1UQTBPVm9YRFRNNU1USXpNVEl6TlRrMU9Wb3dFekVSTUE4
|R0ExVUVBeE1JUVd4cFkyVkVVMU13Z2dHMk1JSUJLd1lIS29aSXpqZ0UKQVRDQ0FSNENnWU
|VBZ1kzTjdZUHFDcDQ1UHNKSUtLUGtSNVBkRHRlb0R1eFR4YXVFQ0UvL2xPRnpTSDRNMXZO
|RVNOSCtuNitrb1lrdgo0ZGt3eURiZVA1dS90MHpjWDJtSzVIWFFOd3lSQ0pXYjNxZGUrZn
|owbnkvZFE2aUxWUEUvc0FjSVIwMWRpTVBEdGJQalZRaDExVGwyCkVNUjR2Zitkc0lTWE4v
|TGtVUnUxNUFtV1hQTitXOXNDRlFEaVI2WWFSV2E0RThiYWo3ZzNJU3RpaS9lVHpRS0JnQ1
|k0MEJTSk1xbzUKK3o1dDJVdFpha3gySXprRUFqVmM4c3NhTU1NZVVGM2RtMW5pemFvRlBW
|akFlNkkydUc0SHIzMktRaVduOUhYUFNnaGVTejZRK0czcQpuTWtoaWp0MkZPbk9MbDJqQj
|gwamhiZ3ZNQUY4YlVtSkVZazJSTDM0eUpWS1UxYTE0dmx6N0JwaE5oOFJmOEs5N2RGUS81
|aDB3dEdCClNtQTV1alk1QTRHRUFBS0JnRnpqdVZwMUZKWUxxWHJkNHorcDdLeGUzTDIzRX
|hFMHBoYUpLQkVqMlRTR1ozVjFFeEk5UTF0djVWRy8KK29ueW9ocytKSDA5QjQxYlk4aTdS
|YVdnU3VPRjFzNEdnRC9vSTM0YThpU3JVeHE0SncwZTd3aS9aaFNBWEdLc1pmb1ZpL0c3Tk
|5UUwpsamYyWVVleXhES0U4SDVCUVAxR3AyTk9NL0tsNHZUeWcrVzRvNEdCTUg4d0RBWURW
|UjBUQVFIL0JBSXdBREFPQmdOVkhROEJBZjhFCkJBTUNCc0F3SHdZRFZSMGpCQmd3Rm9BVW
|NFUStnaTV2aDk1SzAzWGpQU0M4UXl1VDhSOHdIUVlEVlIwT0JCWUVGTDVzb2JQandmZnQK
|UTNDa3poTUI0djNqbC83Tk1COEdBMVVkRVFRWU1CYUJGRUZzYVdObFJGTlRRR1Y0WVcxd2
|JHVXVZMjl0TUFrR0J5cUdTTTQ0QkFNRApNQUF3TFFJVVZReWtHUjlDSzRseElqT05nMnEx
|UFdkcnYwVUNGUUNmWVZOU1ZBdGNzdDNhNTNZZDRoQlNXME5ldlRGak1HRUNBUUV3CkdEQV
|NNUkF3RGdZRFZRUURFd2REWVhKc1JGTlRBZ0lBeURBSEJnVXJEZ01DR2pBSkJnY3Foa2pP
```

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|T0FRREJDNHdMQUlVTS9tR2Y2Z2sKZ3A5WjBYdFJkR2ltSmVCL0J4VUNGR0ZGSnF3WVJ0MV
|dZY0lPUW9HaWFvd3FHelZJCgotLS0tLS09X05leHRCb3VuZHJ5X19fX0ZyaSxfMDZfU2Vw
|XzIwMDJfMDA6MjU6MjEtLQo=
|<4.8.eml

***4.9.eml***

|* Example 4.9.eml
|>4.9.eml
|TUlNRS1WZXJzaW9uOiAxLjAKVG86IFVzZXIyQGV4YW1wbGVzLmNvbQpGcm9tOiBhbGljZU
|Rzc0BleGFtcGxlcy5jb20KU3ViamVjdDogRXhhbXBsZSA0LjkKTWVzc2FnZS1JZDogPDAy
|MTAzMTE2NDU0MDMwMC4zMDRAZXhhbXBsZXMuY29tPgpEYXRlOiBUaHUsIDMxIE9jdCAyMD
|AyIDE2OjQ1OjE0IC0wMzAwIApDb250ZW50LVR5cGU6IGFwcGxpY2F0aW9uL3BrY3M3LW1p
|bWU7IHNtaW1lLXR5cGU9c2lnbmVkLWRhdGE7CiAgICBuYW1lPXNtaW1lLnA3bQpDb250ZW
|50LVRyYW5zZmVyLUVuY29kaW5nOiBiYXNlNjQKQ29udGVudC1EaXNwb3NpdGlvbjogYXR0
|YWNobWVudDsgZmlsZW5hbWU9c21pbWUucDdtCgpNSUlEbVFZSktvWklodmNOQVFjQ29JSU
|RpakNDQTRZQ0FRRXhDVEFIQmdVckRnTUNHakF0QmdrcWhraUc5dzBCQndHZ0lBUWVEUXBV
|CmFHbHpJR2x6SUhOdmJXVWdjMkZ0Y0d4bElHTnZiblJsYm5RdW9JSUM0RENDQXR3d2dnS2
|JvQU1DQVFJQ0FnRElNQWtHQnlxR1NNNDQKQkFNd0VqRVFNQTRHQTFVRUF4TUhRMkZ5YkVS
|VFV6QWVGdzA1T1RBNE1UY3dNVEV3TkRsYUZ3MHpPVEV5TXpFeU16VTVOVGxhTUJNeApFVE
|FQQmdOVkJBTVRDRUZzYVdObFJGTlRNSUlCdGpDQ0FTc0dCeXFHU000NEJBRXdnZ0VlQW9H
|QkFJR056ZTJENmdxZU9UN0NTQ2lqCjVFZVQzUTdYcUE3c1U4V3JoQWhQLzVUaGMwaCtETm
|J6UkVqUi9wK3ZwS0dKTCtIWk1NZzIzaitidjdkTTNGOXBpdVIxMERjTWtRaVYKbTk2blh2
|bjg5Sjh2M1VPb2kxVHhQN0FIQ0VkTlhZakR3N1d6NDFVSWRkVTVkaERFZUwzL25iQ0Vsem
|Z5NUZFYnRlUUpsbHp6Zmx2YgpBaFVBNGtlbUdrVm11QlBHMm8rNE55RXJZb3YzazgwQ2dZ
|QW1PTkFVaVRLcU9mcytiZGxMV1dwTWRpTTVCQUkxWFBMTEdqRERIbEJkCjNadFo0czJxQl
|QxWXdIdWlOcmh1QjY5OWlrSWxwL1IxejBvSVhrcytrUGh0NnB6SklZbzdkaFRwemk1ZG93
|Zk5JNFc0THpBQmZHMUoKaVJHSk5rUzkrTWlWU2xOV3RlTDVjK3dhWVRZZkVYL0N2ZTNSVV
|ArWWRNTFJnVXBnT2JvMk9RT0JoQUFDZ1lCYzQ3bGFkUlNXQzZsNgozZU0vcWV5c1h0eTl0
|eE1STktZV2lTZ1JJOWswaG1kMWRSTVNQVU5iYitWUnYvcUo4cUliUGlSOVBRZU5XMlBJdT
|BXbG9FcmpoZGJPCkJvQS82Q04rR3ZJa3ExTWF1Q2NOSHU4SXYyWVVnRnhpckdYNkZZdnh1
|elRVMHBZMzltRkhzc1F5aFBCK1FVRDlScWRqVGpQeXBlTDAKOG9QbHVLT0JnVEIvTUF3R0
|ExVWRFd0VCL3dRQ01BQXdEZ1lEVlIwUEFRSC9CQVFEQWdiQU1COEdBMVVkSXdRWU1CYUFG
|SEJFUG9JdQpiNGZlU3ROMTR6MGd2RU1yay9FZk1CMEdBMVVkRGdRV0JCUytiS0d6NDhIMz
|dVTndwTTRUQWVMOTQ1Zit6VEFmQmdOVkhSRUVHREFXCmdSUkJiR2xqWlVSVFUwQmxlR0Z0
|Y0d4bExtTnZiVEFKQmdjcWhrak9PQVFEQXpBQU1DMENGRlVNcEJrZlFpdUpjU0l6allOcX
|RUMW4KYTc5RkFoVUFuMkZUVWxRTFhMTGQydWQySGVJUVVsdERYcjB4WXpCaEFnRUJNQmd3
|RWpFUU1BNEdBMVVFQXhNSFEyRnliRVJUVXdJQwpBTWd3QndZRkt3NERBaG93Q1FZSEtvWk
|l6amdFQXdRdU1Dd0NGRDFjU1c2TElVRnplWGxlM1lJNVNLU0Jlci9zQWhRbUNxN3MvQ1RG
|CkhPRWpnQVNlVWpiTXB4NWc2QT09Cg==
|<4.9.eml

***4.10.bin***

|* Example 4.10.bin
|>4.10.bin
|MIIH/wYJKoZIhvcNAQcCoIIH8DCCB+wCAQExCTAHBgUrDgMCGjArBgkqhkiG9w0BBwGgHg
|QcVGhpcyBpcyBzb21lIHNhbXBsZSBjb250ZW50LqCCAuAwggLcMIICm6ADAgECAgIAyDAJ
```

```
|BgcqhkjOOAQDMBIxEDAOBgNVBAMTB0NhcmxEU1MwHhcNOTkwODE3MDExMDQ5WhcNMzkxMj
|MxMjM1OTU5WjATMREwDwYDVQQDEwhBbGljZURTUzCCAbYwggErBgcqhkjOOAQBMIIBHgKB
|gQCBjc3tg+oKnjk+wkgoo+RHk90O16gO7FPFq4QIT/+U4XNIfgzW80RI0f6fr6ShiS/h2T
|DINt4/m7+3TNxfaYrkddA3DJEIlZvep175/PSfL91DqItU8T+wBwhHTV2Iw8O1s+NVCHXV
|OXYQxHi9/52whJc38uRRG7XkCZZc835b2wIVAOJHphpFZrgTxtqPuDchK2KL95PNAoGAJj
|jQFIkyqjn7Pm3ZS1lqTHYjOQQCNVzyyxowwx5QXd2bWeLNqgU9WMB7oja4bgevfYpCJaf0
|dc9KCF5LPpD4beqcySGKO3YU6c4uXaMHzSOFuC8wAXxtSYkRiTZEvfjIlUpTVrXi+XPsGm
|E2HxF/wr3t0VD/mHTC0YFKYDm6NjkDgYQAAoGAXOO5WnUUlgupet3jP6nsrF7cvbcTETSm
|FokoESPZNIZndXUTEj1DW2/lUb/6ifKiGz4kfT0HjVtjyLtFpaBK44XWzgaAP+gjfhryJK
|tTGrgnDR7vCL9mFIBcYqxl+hWL8bs01NKWN/ZhR7LEMoTwfkFA/UanY04z8qXi9PKD5bij
|gYEwfzAMBgNVHRMBAf8EAjAAMA4GA1UdDwEB/wQEAwIGwDAfBgNVHSMEGDAWgBRwRD6CLm
|+H3krTdeM9ILxDK5PxHzAdBgNVHQ4EFgQUvmyhs+PB9+1DcKTOEwHi/eOX/s0wHwYDVR0R
|BBgwFoEUQWxpY2VEU1NAZXhhbXBsZS5jb20wCQYHKoZIzjgEAwMwADAtAhRVDKQZH0IriX
|EiM42DarU9Z2u/RQIVAJ9hU1JUC1yy3drndh3iEFJbQ169MYIEyTCCBMUCAQEwGDASMRAw
|DgYDVQQDEwdDYXJsRFNTAgIAyDAHBgUrDgMCGqCCBF8wGAYJKoZIhvcNAQkDMQsGCSqGSI
|b3DQEHATAjBgkqhkiG9w0BCQQxFgQUQGrsCFJ5um4WAi2eBinAIpaH3UgwOAYDKqszMTEE
|L1RoaXMgaXMgYSB0ZXN0IEdlbmVyYWwgQVNOIEF0dHJpYnV0ZSwgbnVtYmVyIDEuMD4GCy
|qGSIb3DQEJEAIEMS8wLQwgQ29udGVudCBIaW50cyBEZXNjcmlwdGlvbiBCdWZmZXIGCSqG
|SIb3DQEHATBKBgkqhkiG9w0BCQ8xPTA7MAcGBSoDBAUGMDAGBioDBAUGTQQmU21pbWUgQ2
|FwYWJpbGl0aWVzIHBhcmFtZXRlcnMgYnVmZmVyIDIwbQYLKoZIhvcNAQkQAgIxXjFcAgEB
|BgcqAwQFBgcIExtUSElTIElTIEEgUFJJVkFDWSBNQVJLIFRFU1QxMTAvgAgqAwQFBgeGeK
|EjEyFUSElTIElTIEEgVEVTVCBTRUNVUklUWS1DQVRFR09SWS4wbwYLKoZIhvcNAQkQAgox
|YDBeBgUqAwQFBgQrQ29udGVudCBSZWZlcmVuY2UgQ29udGVudCBJZGVudGlmaWVyIEJ1Zm
|ZlcgQoQ29udGVudCBSZWZlcmVuY2UgU2lnbmF0dXJlIFZhbHVlIEJ1ZmZlcjBzBgsqhkiG
|9w0BCRACCzFkoGIwWjELMAkGA1UEBhMCVVMxFjAUBgNVBAoTDVVTIEdvdmVybm1lbnQxET
|APBgNVBAsTCFZEQSBTaXRlMQwwCgYDVQQLEwNWREExEjAQBgNVBAMTCURhaXN5IFJTQQIE
|ClVEMzCB/AYLKoZIhvcNAQkQAgMxgewwgekwgeYEBzU3MzgyOTkYDzE5OTkwMzExMTA0ND
|MzWqGByTCBxqRhMF8xCzAJBgNVBAYTAlVTMRYwFAYDVQQKEw1VUyBHb3Zlcm5tZW50MREw
|DwYDVQQLEwhWREEgU2l0ZTEMMAoGA1UECxMDVkRBMRcwFQYDVQQDEw5CdWdzIEJ1bm55IE
|RTQaRhMF8xCzAJBgNVBAYTAlVTMRYwFAYDVQQKEw1VUyBHb3Zlcm5tZW50MREwDwYDVQQL
|EwhWREEgU2l0ZTEMMAoGA1UECxMDVkRBMRcwFQYDVQQDEw5FbG1lciBGdWRkIERTQTCCAQ
|IGCyqGSIb3DQEJEAIJMYHyMIHvMXICAQEGByoDBAUGBwkTJkVRVUlWQUxFTlQgVEhJUyBJ
|UyBBIFBSSVZBQ1kgTUFSSyBURVNUMTwwOoAIKgMEBQYHhnihLhMsRVFVSVZBTEVOVCBUSE
|lTIElTIEEgVEVTVCBTRUNVUklUWS1DQVRFR09SWS4xeQIBAQYHKgMEBQYHChMtRVFVSVZB
|TEVOVCBUSElTIElTIEEgU0VDT05EIFBSSVZBQ1kgTUFSSyBURVNUMTwwOoAIKgMEBQYHhn
|ihLhMsRVFVSVZBTEVOVCBUSElTIElTIEEgVEVTVCBTRUNVUklUWS1DQVRFR09SWS4wCQYH
|KoZIzjgEAwQvMC0CFQC8MzdlxPdwXBdJE6pMhcq7UpFIWQIUY5aiFIvPV96wSF9sZN2EBE
|lfHMo=
|<4.10.bin
```

4.11.bin

```
|* Example 4.11.bin
|>4.11.bin
|MIIGiAYJKoZIhvcNAQcCoIIGeTCCBnUCAQExADALBgkqhkiG9w0BBwGgggV/MIICmzCCAl
|qgAwIBAgIBATAJBgcqhkjOOAQDMBIxEDAOBgNVBAMTB0NhcmxEU1MwHhcNOTkwODE2MjI1
|MDUwWhcNMzkxMjMxMjM1OTU5WjASMRAwDgYDVQQDEwdDYXJsRFNTMIIBtzCCASsGByqGSM
|44BAEwggEeAoGBALZJGD6KRMEpcZRMAcQSwXp5y1RNqx6B+8ZMsw6UCQbrAdSxyHFLx0XA
```

```
|UCVdnPza5G3T4oZIhIJ9uhWVShb2Ru3d9pjSu36KCoq6Fnu5UAFIk4vrJRVRl1Xcj1MOEK
|lQ/HC3zTBU/dreqKoitaGvi8wCiOeLcF+5reEI1G0pLdbpAhUA3cEv31POCzRgdz4CpL+K
|XZi5ENUCgYAM7lebS73atgdqdDdPVX+d7bxhDetGWTxWCytbDJHOpWJSacrhbT69v/7ht7
|krYTyty65F4wasjCKdnESHC8fN8BzZtU5dc96vDskdWlH1T0R5NVpzqn9GUR+pQhacSOuK
|eWG01S9TIkRjH4a4o1gGJfgpwO+64HXwQsRjZVKbCgOBhQACgYEAmYd0JwNmoLHArdwsdb
|vhbESc2iFtTUdtsWIJ6diuHvI6tJSxo456m3FOAJTJtCVOuWCWGSQB82IM/nXA+87YaADj
|/dVwT98jlhkGlPSxYY86V7EIEaQLJiXwUnaB6gtiDZUq5oa6crKnUIMLqifNG6lNiZrXjR
|g5hD+LxVZNgHqjQjBAMA8GA1UdEwEB/wQFMAMBAf8wDgYDVR0PAQH/BAQDAgGGMB0GA1Ud
|DgQWBBRwRD6CLm+H3krTdeM9ILxDK5PxHzAJBgcqhkjOOAQDAzAAMC0CFGup8E56Wnnj+b
|49K8kGN+kRF6ETAhUAjzRpKouxPAN5lDJNEh/OiftGsjswggLcMIICm6ADAgECAgIAyDAJ
|BgcqhkjOOAQDMBIxEDAOBgNVBAMTB0NhcmxEU1MwHhcNOTkwODE3MDExMDQ5WhcNMzkxMj
|MxMjM1OTU5WjATMREwDwYDVQQDEwhBbGljZURTUzCCAbYwggErBgcqhkjOOAQBMIIBHgKB
|gQCBjc3tg+oKnjk+wkgoo+RHk90O16gO7FPFq4QIT/+U4XNIfgzW80RI0f6fr6ShiS/h2T
|DINt4/m7+3TNxfaYrkddA3DJEIlZvep175/PSfL91DqItU8T+wBwhHTV2Iw8O1s+NVCHXV
|OXYQxHi9/52whJc38uRRG7XkCZZc835b2wIVAOJHphpFZrgTxtqPuDchK2KL95PNAoGAJj
|jQFIkyqjn7Pm3ZS1lqTHYjOQQCNVzyyxowwx5QXd2bWeLNqgU9WMB7oja4bgevfYpCJaf0
|dc9KCF5LPpD4beqcySGKO3YU6c4uXaMHzSOFuC8wAXxtSYkRiTZEvfjIlUpTVrXi+XPsGm
|E2HxF/wr3t0VD/mHTC0YFKYDm6NjkDgYQAAoGAXOO5WnUUlgupet3jP6nsrF7cvbcTETSm
|FokoESPZNIZndXUTEj1DW2/lUb/6ifKiGz4kfT0HjVtjyLtFpaBK44XWzgaAP+gjfhryJK
|tTGrgnDR7vCL9mFIBcYqxl+hWL8bs01NKWN/ZhR7LEMoTwfkFA/UanY04z8qXi9PKD5bij
|gYEwfzAMBgNVHRMBAf8EAjAAMA4GA1UdDwEB/wQEAwIGwDAfBgNVHSMEGDAWgBRwRD6CLm
|+H3krTdeM9ILxDK5PxHzAdBgNVHQ4EFgQUvmyhs+PB9+1DcKTOEwHi/eOX/s0wHwYDVR0R
|BBgwFoEUQWxpY2VEU1NAZXhhbXBsZS5jb20wCQYHKoZIzjgEAwMwADAtAhRVDKQZH0IriX
|EiM42DarU9Z2u/RQIVAJ9hU1JUC1yy3drndh3iEFJbQ169oYHbMIHYMIGZMAkGByqGSM44
|BAMwEjEQMA4GA1UEAxMHQ2FybERTUxcNOTkwODI3MDcwMDAwWjBpMBMCAgDIFw05OTA4Mj
|IwNzAwMDBaMBMCAgDJFw05OTA4MjIwNzAwMDBaMBMCAgDTFw05OTA4MjIwNzAwMDBaMBMC
|AgDSFw05OTA4MjIwNzAwMDBaMBMCAgDUFw05OTA4MjQwNzAwMDBaMAkGByqGSM44BAMDLw
|AwLAIUfmVSdjP+NHMX0feW+aDU2G1cfT0CFAJ6W7fVWxjBz4fvftok8yqDnDWhMQA=
|<4.11.bin
```

5.1.bin

```
|* Example 5.1.bin
|>5.1.bin
|MIIBHgYJKoZIhvcNAQcDoIIBDzCCAQsCAQAxgcAwgb0CAQAwJjASMRAwDgYDVQQDEwdDYX
|JsUlNBAhBGNGvHgABWvBHTbi7NXXHQMA0GCSqGSIb3DQEBAQUABIGAC3EN5nGIiJi2lsGP
|cP2iJ97a4e8kbKQz36zg6Z2i0yx6zYC4mZ7mX7FBs3IWg+f6KgCLx3M1eCbWx8+MDFbbpX
|adCDgO8/nUkUNYeNxJtuzubGgzoyEd8Ch4H/dd9gdzTd+taTEgS0ipdSJuNnkVY4/M652j
|KKHRLFf02hosdR8wQwYJKoZIhvcNAQcBMBQGCCqGSIb3DQMHBAgtaMXpRwZRNYAgDsiSf8
|Z9P43LrY4OxUk660cu1lXeCSFOSOpOJ7FuVyU=
|<5.1.bin
```

5.2.bin

```
|* Example 5.2.bin
|>5.2.bin
|MIIBZQYJKoZIhvcNAQcDoIIBVjCCAVICAQIxggEAMIG9AgEAMCYwEjEQMA4GA1UEAxMHQ2
|FybFJTQQIQRjRrx4AAVrwR024uzV1x0DANBgkqhkiG9w0BAQEFAASBgJQmQojGi7Z4IP+C
|VypBmNFoCDoEp87khtgyff2N4SmqD3RxPx+8hbLQt9i3YcMwcap+aiOkyqjMalT03VUC0X
|BOGv+HYI3HBZm/aFzxoq+YOXAWs5xlGerZwTOc9j6AYlK4qXvnztR5SQ8TBjlzytm4V7zg
|+TGrnGVNQBNw47Ewoj4CAQQwDQQLTWFpbExpc3RSQzIwEAYLKoZIhvcNAQkQAwcCAToEGH
|cUr5MSJ/g9HnJVHsQ6X56VcwYb+OfojTBJBgkqhkiG9w0BBwEwGgYIKoZIhvcNAwIwDgIC
|AKAECJwE0hkuKlWhgCBeKNXhojuej3org9Lt7n+wWxOhnky5V50vSpoYRfRRyw==
|<5.2.bin
```

5.3.eml

```
|* Example 5.3.eml
|>5.3.eml
|TUlNRS1WZXJzaW9uOiAxLjAKTWVzc2FnZS1JZDogPDAwMTAzMTEyMDA1MjAzLjAwMzQ5QG
|FteWVtaWx5LmlnLmNvbT4KRGF0ZTogVHVlLCAzMSBPY3QgMjAwMCAxMjowMDo1MiAtMDYw
|MCAoQ2VudHJhbCBTdGFuZGFyZCBUaW1lKQpGcm9tOiBVc2VyMQpUbzogVXNlcjIKU3Viam
|VjdDogRXhhbXBsZSA1LjMKQ29udGVudC1UeXBlOiBhcHBsaWNhdGlvbi9wa2NzNy1taW1l
|OwoJbmFtZT1zbWltZS5wN207CglzbWltZS10eXBlPWVudmVsb3BlZC1kYXRhCkNvbnRlbn
|QtVHJhbnNmZXItRW5jb2Rpbmc6IGJhc2U2NApDb250ZW50LURpc3Bvc2l0aW9uOiBhdHRh
|Y2htZW50OyBmaWxlbmFtZT1zbWltZS5wN20KCk1JSUJIZ1lKS29aSWh2Y05BUWNEb0lJQk
|R6Q0NBUXNDQVFBeGdjQXdnYjBDQVFBd0pqQVNNUkF3RGdZRFZRUURFd2REWVhKc1VsTkIK
|QWhCR05HdkhnQUJXdkJIVGJpN05YWEhRTUEwR0NTcUdTSWIzRFFFQkFRVUFCSUdBQzNFTj
|VuR0lpSmkybHNHUGNQMmlKOTdhNGU4awpiS1F6MzZ6ZzZaMmkweXg2ellDNG1aN21YN0ZC
|czNJV2crZjZLZ0NMeDNNMWVDYld4OCtNREZiYnBYYWRDRGdPOC9uVWtVTlllTnhKCnR1en
|ViR2d6b3lFZDhDaDRIL2RkOWdkelRkK3RhVEVnUzBpcGRTSnVObmtWWTQvTTY1MmpLS0hS
|TEZmMDJob3NkUjh3UXdZSktvWkkKaHZjTkFRY0JNQlFHQ0NxR1NJYjNEUU1IQkFndGFNWH
|BSd1pSTllBZ0RzaVNmOFo5UDQzTHJZNE94VWs2NjBjdTFsWGVDU0ZPU09wTwpKN0Z1VnlV
|PQoK
|<5.3.eml
```

6.0.bin

```
|* Example 6.0.bin
|>6.0.bin
|MF4GCSqGSIb3DQEHBaBRME8CAQAwBwYFKw4DAhowKwYJKoZIhvcNAQcBoB4EHFRoaXMgaX
|Mgc29tZSBzYW1wbGUgY29udGVudC4EFEBq7AhSebpuFgItngYpwCKWh91I
|<6.0.bin
```

```
***7.1.bin***

|* Example 7.1.bin
|>7.1.bin
|MFcGCSqGSIb3DQEHBqBKMEgCAQAwQwYJKoZIhvcNAQcBMBQGCCqGSIb3DQMHBAiza2v7Yj
|EIToAg+vzt2z8YFx04iRHqNNYg2/TD2VgV75M7mvXXBPa1cOI=
|<7.1.bin

***7.2.bin***

|* Example 7.2.bin
|>7.2.bin
|MIGVBgkqhkiG9w0BBwaggYcwgYQCAQIwQwYJKoZIhvcNAQcBMBQGCCqGSIb3DQMHBAgHJy
|CFkJ6wfoAg0iCPZ0iKy0HkImhdvncFUibt4wG9AJFYpzVuvEuiBzOhOjA4BgMqqzMxMQQv
|VGhpcyBpcyBhIHRlc3QgR2VuZXJhbCBBU04gQXR0cmlidXRlLCBudW1iZXIgMS4=
|<7.2.bin
```

C. Acknowledgements

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The examples are displayed with a modified version of Peter Gutmann's "dumpasn1" program. Peter and Jim Schaad and Blake Ramsdell have been updating the program based on input from the process of writing this draft.

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