

**NOKIA**

**Release 4  
Nokia Lawful Interception Gateway**

**LeaViewer Guide**

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## Summary of changes

### Changes between releases 4 and 3

Chapter 2.2 *li2html.conf* has been updated, new fields and descriptions have been added.

In Chapter 3.1 *Compilation*, the compilation command `gcc LeaViewer.c li2html.c openCC.c openSMS.c -o LeaViewer.cgi`, `make` has been changed to `gmake clean, gmake`.

In Chapter 3.2 *Installing to the correct location*, the image directory is no longer required and has been removed from the document.

In Chapter 5 *Examples of using LeaViewer*, all the examples have been updated.

# 1 Purpose of LeaViewer

## 1.1 Introduction

The LeaViewer software program was developed for browsing intercept data from an LEA user's computer. It makes it possible for users to view the Intercept Related Information (IRI). Also the Communication Content (CC) record headers are printed in plain text, and the binary data is transferred in hexadecimal format. The intercept data is assumed to follow the Type-Value (TV) or Type-Length-Value (TLV) data format. The ASN.1/BER format is not supported. A different freeware tool (dumpasn1) to view BER encoded files is included.

A prerequisite for using LeaViewer program is that the computer where the intercept data is stored supports an HTTP server, and the LeaViewer should be installed to this computer

With LeaViewer the intercept data files can be viewed using a Web browser (HTTP client). The program source files in C language are distributed free of charge, and users are allowed to make changes. Nokia does not take any responsibility for the use of the LeaViewer program, and may not support it in the future.

## 1.2 Users of LeaViewer

Lawful Enforcement Agencies (LEAs) are the main users of LeaViewer. However, LEA users usually need more sophisticated tools to study intercept data. LeaViewer is meant only for verifications purposes. In addition, the program can be used, for example, for testing and demonstration purposes.

## 1.3 Legal issues

Nokia is not responsible for the use of the LeaViewer program, and may not support it in the future. The source code files (see Chapter 2.1) are allowed to be distributed, used, and modified as long as the Nokia note in it is included. However, no charge will be required for the source code files, or the modified source or binary files.

The *dumpasn1* tool is used for viewing BER encoded files. It is a third party freeware, and Nokia is not responsible for the tool or its use.

# 2 Program files

## 2.1 Source code files for LeaViewer

The C language files

- `LeaViewer.c`
- `li2html.c`
- `li2html.h`
- `liCommon.h`
- `libCommon.h`
- `lipUtils.h`
- `openCC.c`
- `openCC.h`
- `openSMS.c`
- `openSMS.h`

contain the code of the main program. They use the following header files, which have to be present in the compilation environment:

- `sdtlib.h`
- `stdio.h`
- `string.h`
- `stdarg.h`
- `time.h`
- `ctype.h`
- `dirent.h`
- `sys/stat.h`
- `sys/types.h`
- `unistd.h`
- `fcntl.h`

## 2.2 li2html.conf

LeaViewer has one configuration file (`li2html.conf`). It contains the following information:

- The default directory (under the user's home directory) where the program starts to browse for intercept data files. If authentication is not used, the path is asked for from the user and this configuration item is not used.
- The plain text explanations associated to the ASCII syntax numbers. (This allows the user, for example, to define the texts in their native language instead of having to use the default English texts.)
- The fields of the intercept data that will be displayed.

Below is an example of a configuration file (the lines are numbered for explanatory purposes). See *Nokia LIG Release 4 Product Documentation: LEA Interface Guide* for content descriptions.

```
1. 130=Version:-u
2. 131=HeaderLength:-u
3. 132=PayloadLength:-u
4. 133=PayloadType:*p 33=IPv4&87=IPv6&129=GPRS
   Attach&130=GPRS Detach&131=PDP Context
   Activation&132=Interception Activation with PDP
   Context Active&133=PDP Context Deactivation&134=Cell
   Update&135=SMS&136=PDP Context Update&137=Routing Area
   Update&138=SIP Message&139=SIP User Message&140=SIP
   Session Activation&141=SIP Session
   Deactivation&142=SIP Session Update&252=Interception
   Activation at LIE with no context&253=Interception
   Activation at LIG&254=Interception Activation with no
   PDP Context Active&255=Interception Deactivation
5. 134=PayloadTimeStamp:t
6. 135=TargetID:a
7. 136=ChannelID:u
8. 137=PayloadDirection:p 0=MT&1=MO
9. 138=NodeType:p 1=LIC&2=LIB&3=GGSN&4=SGSN&5=CPS
10. 139=NodeID:N
11. 140=InterceptTimeStamp:t
12. 141=CCSeqNumber:u
13. 142=IRISeqNumber:u
14. 144=CorrelationNumber:s
15. 251=MainElementID:-u
16. 252=HeaderElementID:-u
```

- 17. 253=PayloadElementID:-u
- 18. 254=LIID:a
- 19. 255=PrivateExtension:a
- 20. 192=IMEI:m
- 21. 193=MSISDN:m
- 22. 194=PDPTTypeOrg:u
- 23. 195=PDPTTypeNumber:u
- 24. 196=CGI/SAI:q
- 25. 197=RAI(NewRAI):y
- 26. 198=PDP Context:-u
- 27. 199=SGSNAddress:I
- 28. 200=PDPAddress:I
- 29. 201=DynPDPAddress:p 0=static&1=dynamic&2=undefined
- 30. 202=APName:a
- 31. 203=ReasonPDP:p 0=Unknown&1=Request Accepted&2=No Resources Available&3=Service Not Supported&4=User Authentication Failed&5=System Failure&6=Mandatory IE Incorrect&7=Mandatory IE Missing&8=Optional IE Incorrect&9=Invalid Message Format&10=Version Not Supported&11=Deletion Before Activation Ends&12=Unknown Failure&101=Init By SGSN&102=SGSN Down&103=Init By GGSN&104=LIE Disabled&105=LIE Conf Changed&201=SGSN Change&202=QoS
- 32. 204=IMSI:m
- 33. 205=NSAPI:u
- 34. 152=Initiator:p 0=Unknown&1=MS&2=Network
- 35. 160=QoSProfile:a
- 36. 161=QoSProfileType:a
- 37. 145=AccessNwId:a
- 38. 146=AccessNwType:p 0=Unknown&1=GERAN&2=UTRAN&3=WLAN
- 39. 158=Old RAI:y
- 40. 208=MM context:-u
- 41. 209=ReasonMM:p 0=Unknown&1=Request Accepted&2=No Resources Available&3=Service Not Supported&4=User Authentication Failed&5=System Failure&101=MS Detach&102=MS Attach Failed&103=RA Update Failed&108=PAPU Restart&109=Cannot Intercept&201=Inter SGSN&202=SGSN To New Network&203=SGSN From New Network
- 42. 216=SMS message:-u
- 43. 217=SMSData:+w

- 44. 162=ReasonSMS:p 0=Unknown&1=SMS Ok&2=SMS Failure
- 45. 167=SIP message:-u
- 46. 169=SIP session:-u
- 47. 163=SessionID:a
- 48. 170=SIPURL:a
- 49. 172=TELURL:a
- 50. 149=CSCFType:p  
0=Unknown&1=Proxy&2=Interrogating&3=Serving&4=Registrar&5=ISC
- 51. 148=ChId:a
- 52. 164=Cause code:p 0=Unknown&100=Protocol Reason&101=Externally Initiated Release&200=No Response Protocol&201=Erroneous Protocol Message&300=Internally Served&301=Request Refused&302=Authentication Failure&303=Internally Initiated Release&304=Out Of Licence&400=Initial Value&401=Resource Release Error&402=Overload&403=Missing Original Valid Undefined Parameter&405=Unclassified Database Error&406=Communication Error&407=Data Not Found&408=SIP Transport Error
- 53. 165=SIPCauseInfo:a
- 54. 166=SIPHeader:a
- 55. 168=SIPPayload=:a
- 56. 147=CcFtc:a
- 57. 151=Ias:a
- 58. 153=IntType:p 0=Unknown&1=IRI&2=MO-CC&3=MO-CC + IRI&4=MT-CC&5=MT-CC + IRI&6=MO-CC + MT-CC&7=MO-CC + MT-CC + IRI
- 59. 155=IriFtc:u
- 60. 156=LeaId:a
- 61. 173=UserDataType:p 0=Unknown&1=Not supported&2=GPRS&3=UMTS&4=IMS&5=GPRS or UMTS
- 62. 154=IriDataType:p 0=Unknown&1=Not Supported&2=GPRS&3=UMTS&4=IMS&5=GPRS or UMTS
- 63. 171=Status:p 0=Unknown&1=Failed&2=Successful&3=Not supported&4=Ok not reg&5=Ok and reg&6=Ok using&7=Ok and proxy reg&8=Ok and proxy using&9=Ok and serving reg&10=Ok and serving using
- 64. 159=PayloadUsecs:u
- 65. 224=ZeroTimeStamp:t
- 66. 225=WarrantID:a

- 67. 226=Comment:a
- 68. 999=This is none field:-u
- 69. 175=Zero record payload:-u
- 70. 1000=Event:\*p 1=PDP Context Activation&2=Interception Activation with PDP Context Active&4=PDP Context Deactivation&5=GPRS Attach&6=GPRS Detach&10=Cell or RA Update&11=SMS&13=PDP Context Modification
- 71. 1001=Communication Identity Number:u
- 72. 1002=Operator ID:a
- 73. 1003=Network Element ID:a
- 74. 1004=PayLoad Timestamp:a
- 75. 1005=Intercept Call Direction:p 0=Not Available&1=Originating Target&2=Terminating Target
- 76. 1006=RAI:a
- 77. 1007=CGI:a
- 78. 1008=SAI:a
- 79. 1009=Party Qualifier:p 3=GPRS Target
- 80. 1010=IMEI:a
- 81. 1011=IMSI:a
- 82. 1012=MSISDN:a
- 83. 1013=Address type:p 0=IPv4&1=IPv6
- 84. 1014=PDP Address:a
- 85. 1026=PDP Address Assignment:p 0=Static&1=Dynamic&2=not known
- 86. 1015=Nature of the call:p 1=SMS&5=PacketData
- 87. 1016=SMS Initiator:p 0=Target&1=Server&2=Undefined
- 88. 1017=SMS Status:p 0=Succeed-transfer&1=Not-succeed-transfer&2=Undefined
- 89. 1018=SGSN Address:a
- 90. 1027=Failure reason:u
- 91. 1019=Domain ID:a
- 92. 1020=IRI Version:u
- 93. 1021=IMS Event:\*p 1=SIP Message
- 94. 1022=SIP URI:a
- 95. 1023=TEL URI:a
- 96. 1024=SessionCorrelationNumber:a
- 97. 1025=SIP Message:a

- 98. 1028=Intercepted Call Direct:p 0=not Available&1=originating Target&2=terminating Target
- 99. 1029=Service Center Address:a
- 100. 1030=GGSN Address:a
- 101. 1031=UMTS QOS:p 1=qosMobileRadio&2=qosGn
- 102. 1999=Never printed:-u 0=undefined

Lines 1 - 102 have the following format :

<number>=<description>:<format> <value list if format is 'p'>

The <number> is an unsigned integer in the range 1-9999. The <description> may contain visible ASCII characters, spaces included. However, it must not contain the separator character colon ':'.

For example, in line 24, 196=CGI/SAI:q, means that field type 196 in the raw data header is printed in the browser using the text string CGI/SAI. If you want to use a longer text, you could change the configuration to:

196=CellGlobalIdentifier/ServiceAreaIdentifier:q

The <format> contains a specifier preceded by an optional flag, as follows:

<flag><specifier>.

The following <flag> values are used in the configuration file (li2html.conf):

<i>Flag</i>	<i>Description</i>
-	Not printed in the output.
+	A new table row.
*	A new table row with a column span and the field text is printed in larger font.

The following <specifier> values are used in the configuration file (li2html.conf):

<i>Specifier</i>	<i>Description</i>
a	ASCII text
l	IPv4 or IPv6 address
m	Packed decimal lowest byte lowest nibble (four bits) first
n	Unsigned 64 bit integer
N	Node ID
p	Pick from the following <number>=<description> list
q	Cell Global Identifier (CGI)
s	Correlation number

<i>Specifier</i>	<i>Description</i>
t	Time in UTC time
u	Unsigned integer. The format '-u' is used if <format> is missing.
w	SMS data
y	Routing Area Identity (RAI)

If a field has the value 'p' in <format>, it also contains the definition of a <number>=<description> list. An example of this is line 29:

```
201=DynPDPAddress:p 0=static&1=dynamic&2=undefined
```

This means that for type 201 (displayed as DynPDPAddress when browsing), value 0 is shown as 'static', value 1 is shown as 'dynamic', and value 2 is shown as 'undefined' accordingly. The raw text item '201=1' means that DynPDPAddress item has the value 'dynamic'.

---

### Note

The values are separated by an ampersand (&), and <description> may contain visible ASCII characters, spaces included, but it must not contain the characters '=' or '&'.

---

## 2.3 LeaViewer.pdf

This document in PDF format.

## 2.4 Files for dumpasn1

The source code for dumpasn1 is included in the delivery for viewing BER encoded intercept data. The source code is not made by Nokia, and can be found free of charge from <http://www.cs.auckland.ac.nz/~pgut001/dumpasn1.c>. A short usage note is provided by the program:

```
DumpASN1 - ASN.1 object dump/syntax check program.
Copyright Peter Gutmann 1997 - 2000. Last updated 21 November 2000.
Usage: dumpasn1 [-acdefhlpsxz] <file>
- = Take input from stdin (some options may not work properly)
-<number> = Start <number> bytes into the file
-- = End of arg list
-a = Print all data in long data blocks, not just the first 128 bytes
-c<file> = Read Object Identifier info from alternate config file
      (values will override equivalents in global config file)
-d = Print dots to show column alignment
-e = Don't print encapsulated data inside OCTET/BIT STRINGS
-f<file> = Dump object at offset -<number> to file (allows data to be
```

extracted from encapsulating objects)

- h = Hex dump object header (tag+length) before the decoded output
- hh = Same as -h but display more of the object as hex data
- l = Long format, display extra info about Object Identifiers
- p = Pure ASN.1 output without encoding information
- s = Syntax check only, don't dump ASN.1 structures
- t = Display text values next to hex dump of data
- x = Display size and offset in hex not decimal
- z = Allow zero-length items

Warnings generated by deprecated OIDs require the use of '-l' to be displayed.  
Program return code is the number of errors found or EXIT\_SUCCESS.

The following files are included in the delivery

---

<b>Name</b>	<b>Description</b>
dumpasn1.c	The source file.
dumpinfo.h	The header file that contains the textual presentation of the used OIDs (Provided by Nokia).
Makefile.dumpasn	Makefile for dumpasn1.
dumpasn1.cfg	A configuration file for dumpasn.

---

For further details see the instructions in the source code.

# 3 Installing LeaViewer

## 3.1 Compilation

The files `LeaViewer.c`, `li2html.c`, `openCC.c` and `openSMS.c` contain the source code of the program. They must be compiled with the Makefile to produce the LeaViewer executable. The header files `li2html.h`, `liCommon.h`, `lipUtils.h`, `openCC.h`, `nextBer.h`, and `openSMS.h` have to be available at the compilation. The makefile `Makefile` must be available also. The compilation can be performed, for instance, in a Unix environment by giving the following commands:

```
gmake clean
gmake
```

However, compilation is different in different environments, so further details cannot be given here. The compilation is assumed to produce an executable binary file named `LeaViewer.cgi`.

After compiling, the binary file `LeaViewer.cgi` has to be given execution rights. This can be done in a Unix environment by giving the command:

```
chmod a+x LeaViewer.cgi
```

## 3.2 Installing to the correct location

The LeaViewer should be installed on a computer where the intercept data is stored. This computer should have a working HTTP server.

To install the executable LeaViewer in your computer, you usually need to have root user rights. The commands below show an example on a Linux computer.



### To install LeaViewer

1. Login as 'root' user.

```
login root
```

2. Move the `LeaViewer.cgi` and `li2html.conf` files under the directory where your cgi-scripts are run (`/home/httpd/cgi-bin/lea` in this example).

```
cd /home/httpd/cgi-bin/
```

```
mkdir lea
```

```
cd lea
```

```
cp <current_location>/LeaViewer.cgi .
```

```
cp <current_location>/li2html.conf .
```

3. Change the access permissions so that `LeaViewer.cgi` is executable.

```
chmod a+x LeaViewer.cgi
```

With authentication you can restrict the users of LeaViewer. If you want to use authentication, you have to edit a proper `.htaccess` file in this directory. Check the HTTP server authentication configuration in your environment.

# 4

## Using LeaViewer

The use of LeaViewer requires a Web browser where the URL is given, for example:

```
http://<host-name>/cgi-bin/lea/LeaViewer.cgi
```

<host-name> is the computer name or IP address where the intercept data is stored.

If authentication is used, the browser prompts for the username and password before entering LeaViewer.cgi. Then LeaViewer.cgi prompts for the directory where the intercept data is stored.

The browser shows as links all subdirectories and files under the directory where it assumes the intercept data to be stored. The **Top** link takes the user back to this level again.

Clicking a directory link takes the user to the subdirectory in question. There the directories and files are shown as links.

Clicking a file link shows the file contents. Here the **Next** link takes the user to the next file in the current directory and **?** shows the raw data in question.



# 5

## Examples of using LeaViewer

All the examples given here use the configuration file example in Chapter 2.2.

### 5.1 Starting LeaViewer

Start by giving a URL, for example, to your Web browser. The computer name or IP address is the (remote) computer where intercept data is collected and LeaViewer is installed. In Figure 1 the URL is for example:  
`http://<computer name>/<path>/LeaViewer.cgi`

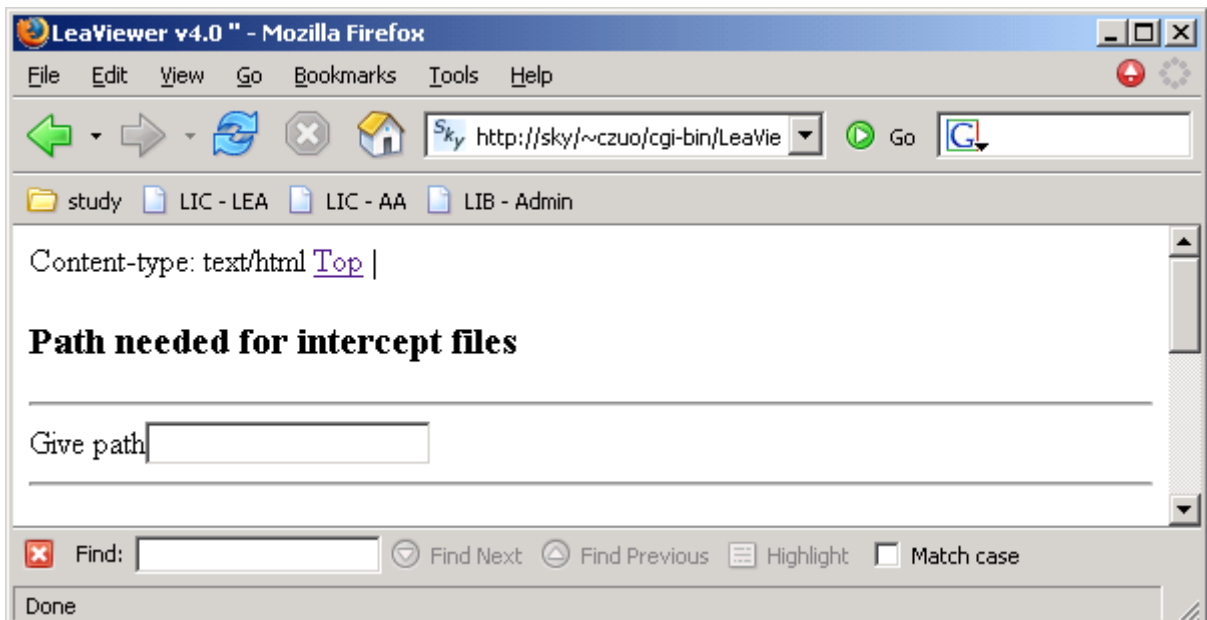


Figure 1. LeaViewer start-up page.

## 5.2 Giving location of intercept data files

The directory containing the intercept data files is requested. After giving the path, enter a new line. In Figure 2 the path is `./data`.

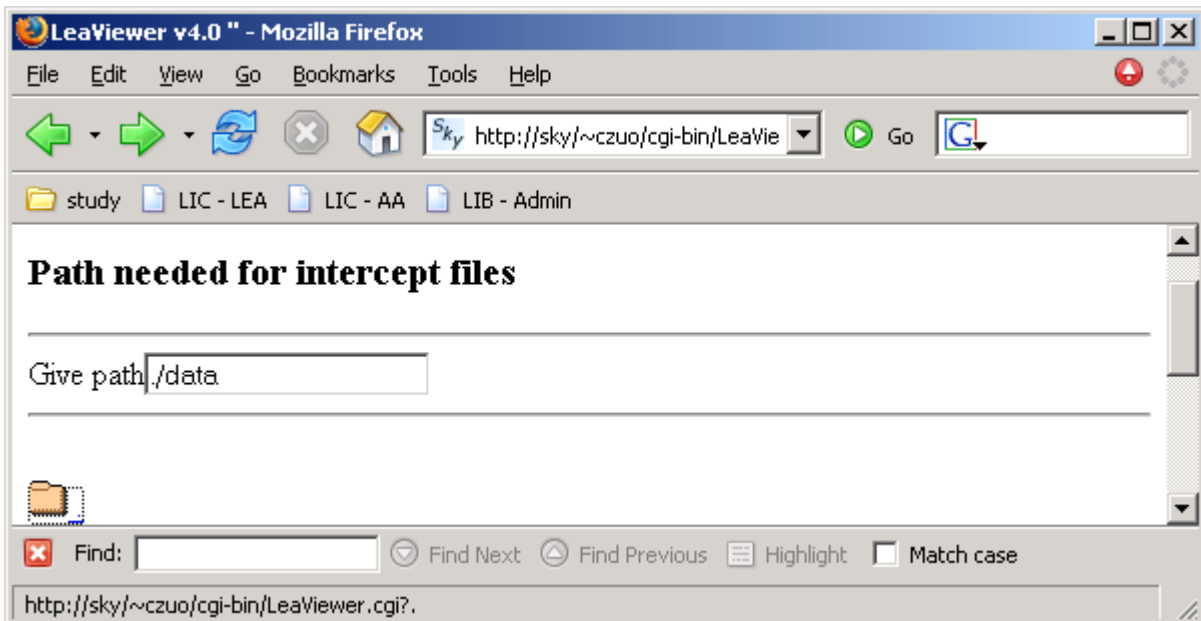


Figure 2. Directory path page

## 5.3 Displaying the directory contents

After giving the directory path, your Web browser displays the top page. The top page shows the contents of the directory containing the intercept data files, see Figure 3.

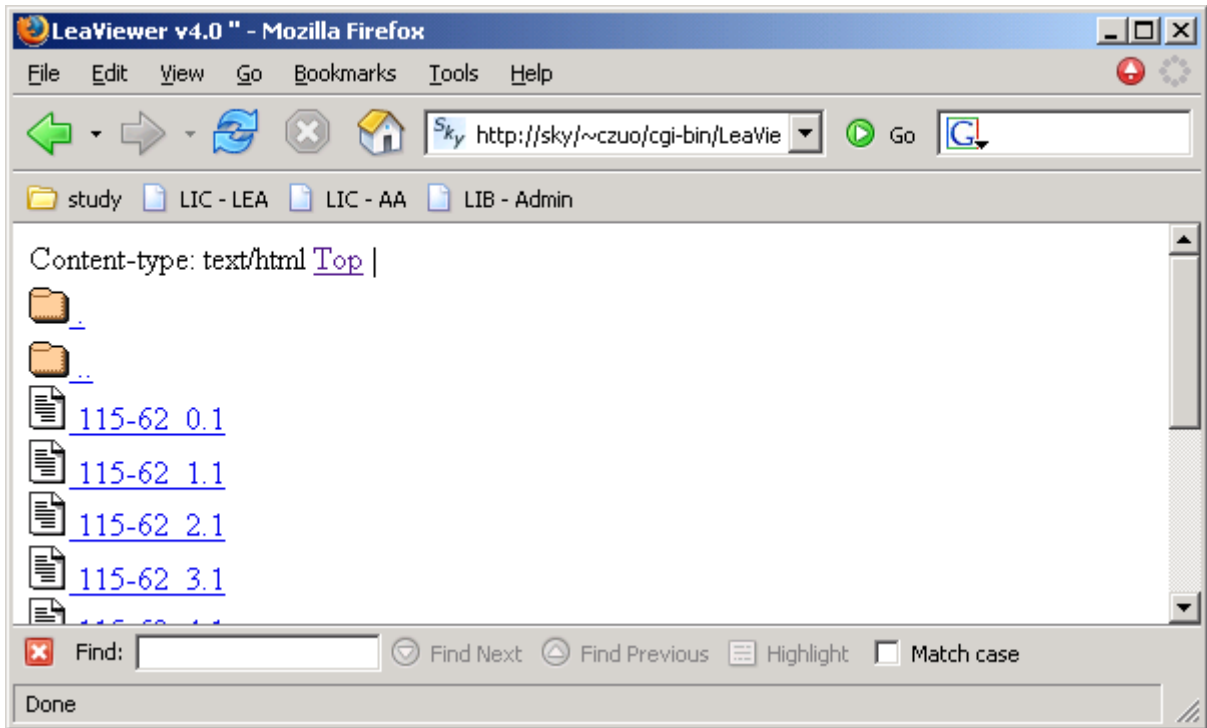


Figure 3. Display of intercept data files.

## 5.4 Displaying a zero file

When you click a zero file link, the relevant fields of the file are shown as plain text. As the purpose of a zero file is to indicate the creation of interception, no actual Interception-Related Information (IRI) or Communication Content (CC) data is available. In Figure 4 below is an example of a LIG release 4 TV encoded zero file, and in Figure 5 is an example of a LIG release 3 TV encoded zero file.

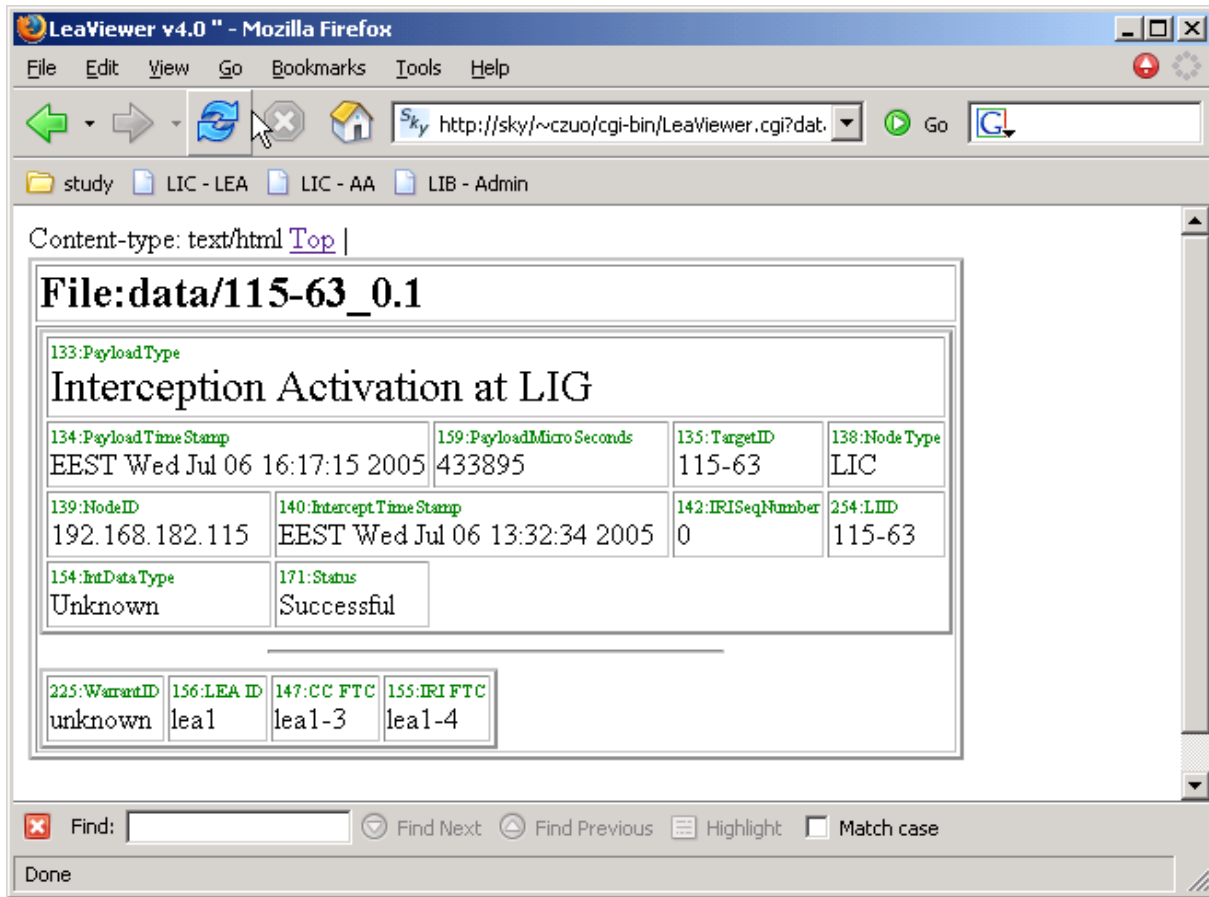


Figure 4. Displaying a LIG release 4 TV encoded zero file

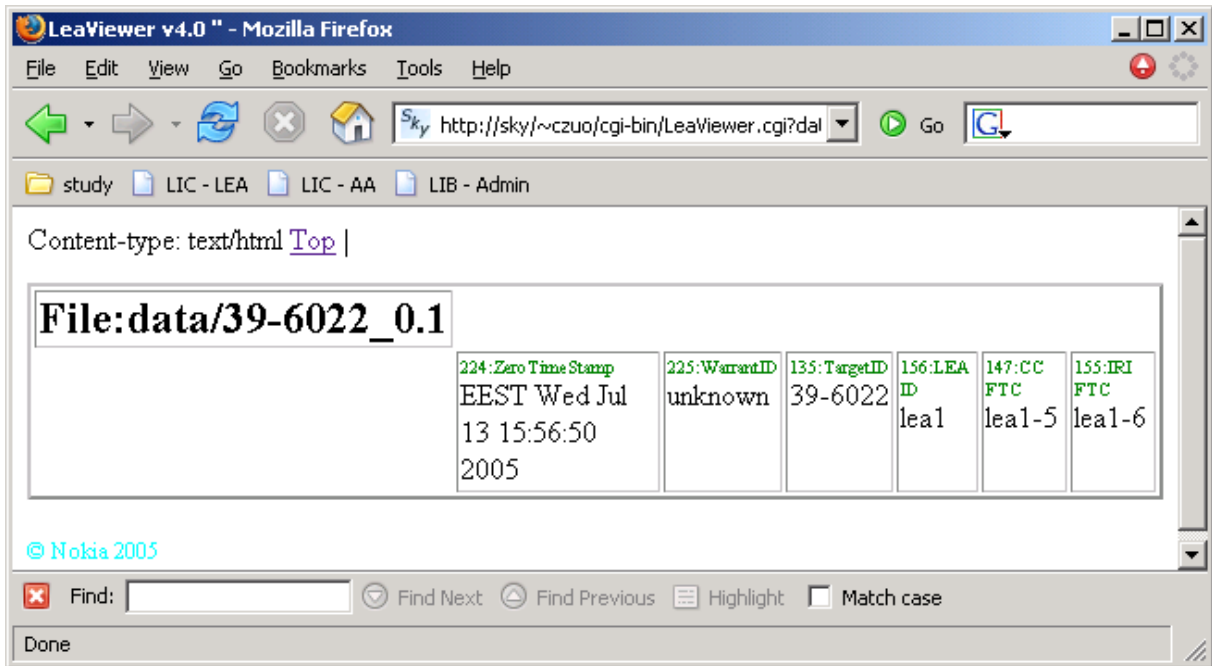


Figure 5. Displaying a LIG release 3 TV encoded zero file

## 5.5 Browsing IRI files

When you click a file link, the Contents of the file are shown as plain text. Different IRI events are shown according to the LeaViewer configuration file, see Figure 6.

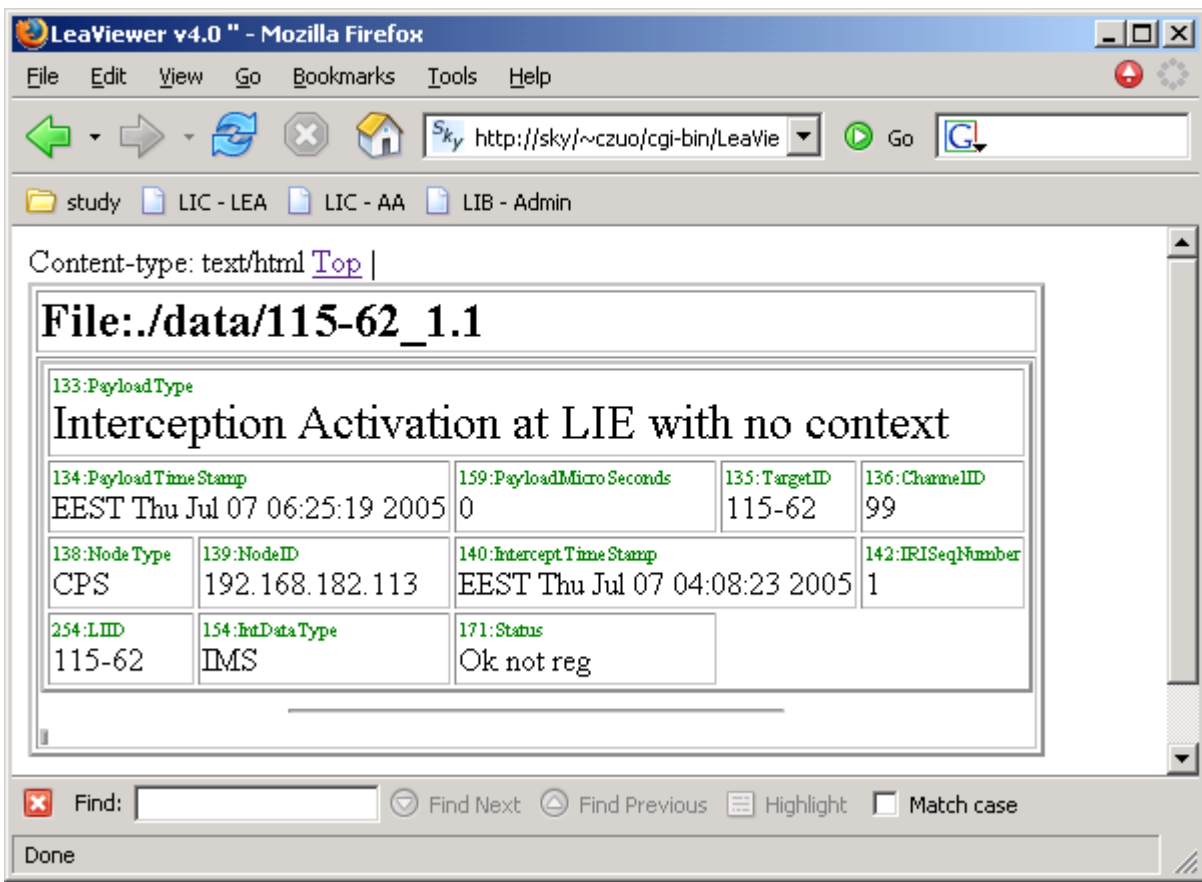


Figure 6. Browsing IRI data file.

## 5.6 Browsing CC files

IPv4 data is shown in hexadecimal format, and IPv4 header information as plain text. Figure 7 shows a view of intercepted data:

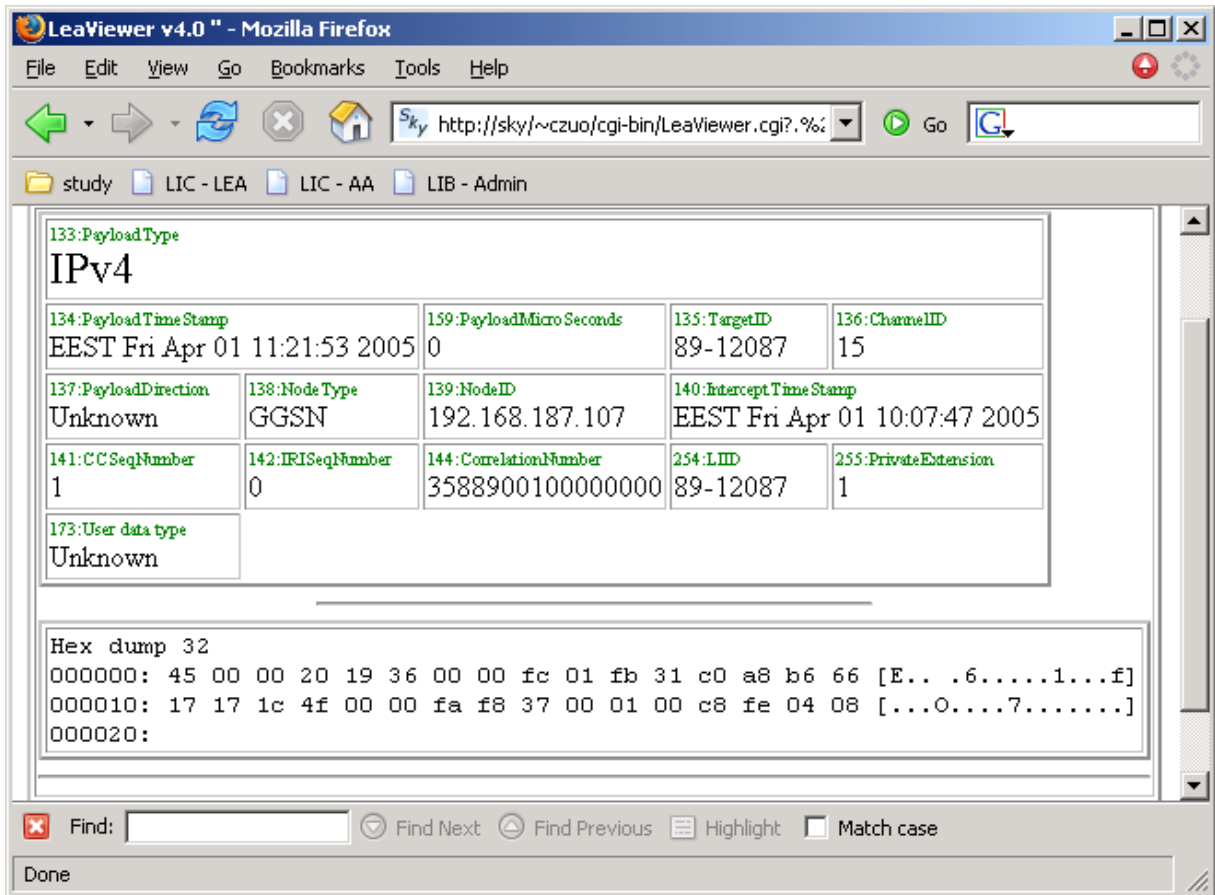


Figure 7. Browsing a CC data file

## 5.7 Subdirectory

A subdirectory is accessed by clicking a directory link, which is marked by a folder icon in front of the directory name (see Figure 8).

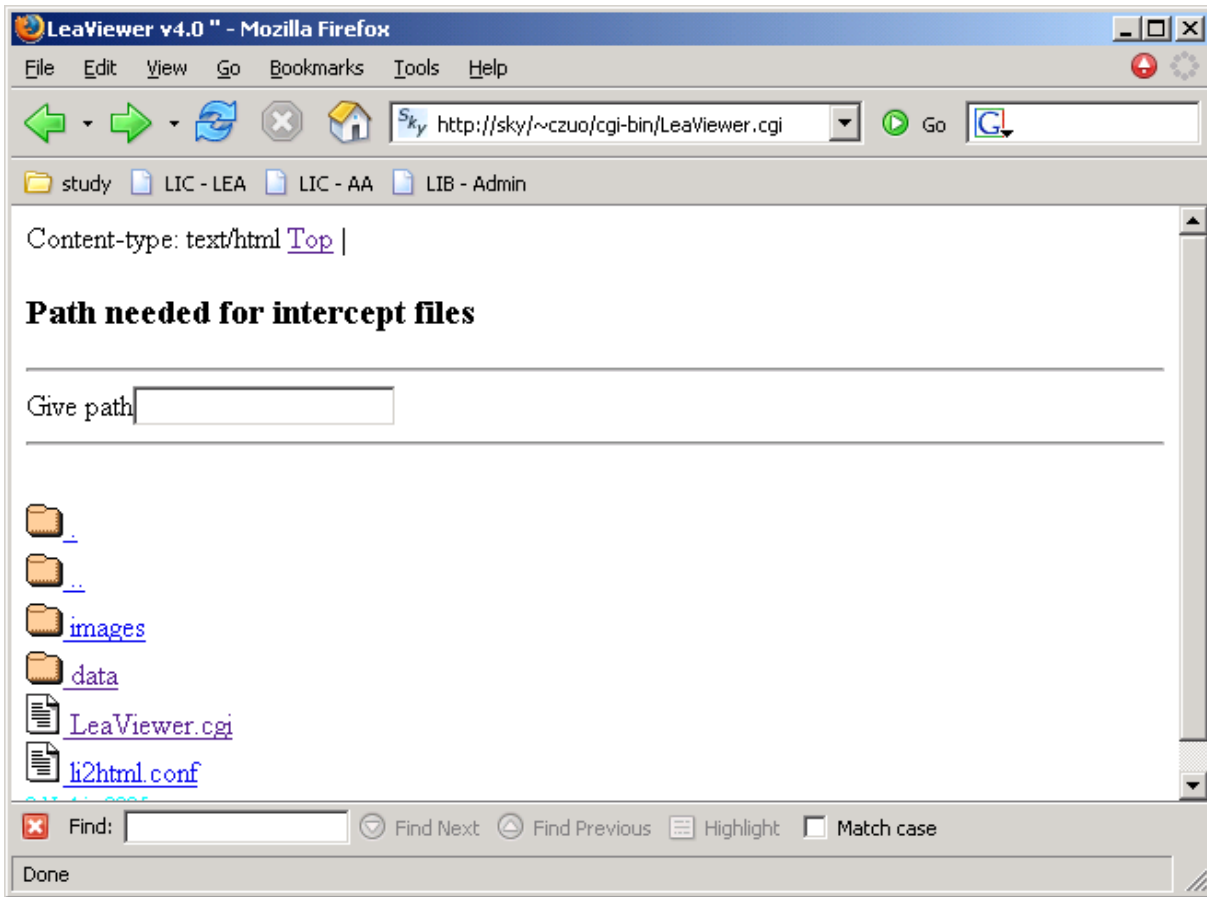


Figure 8. Subdirectory link

**References**

1. Nokia LIG Release 4 Product Documentation: LEA Interface Guide

**Glossary**

ASN.1/BER	Abstract Syntax Notation One/Basic Encoding Rules
ASCII	American Standard Code for Information Interchange
CC	Communication Content
CGI	Cell Global Identifier
cgi	common gateway interface
HTTP	HyperText Transfer Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
IRI	Interception-Related Information
LEA	Law Enforcement Agency
OID	Object Identifier
PDF	Portable Document Format
RAI	Routing Area Identity
SMS	Short Message Service
TLV	Type Length Value; binary encoding format
TV	Type Value; character string encoding format
UTC	Universal Time Coordinated; epoch time is 1.1.1970.

