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# A JOURNEY INTO LITECOIN FORENSIC ARTIFACTS

*GIAC (GCFA) Gold Certification*

Author: Daniel Piggott, [piggott.daniel@gmail.com](mailto:piggott.daniel@gmail.com)  
Advisor: Richard Carbone

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## Abstract

Tor, Silk Road, and Litecoin. Bitcoin artifacts now appear in forensic tools such as Magnet Forensics Internet Evidence Finder (IEF). As the price of Bitcoins increases, it could potentially price out participants. Litecoin provides a cheaper alternative attempt at a peer-to-peer currency. Litecoin, like Bitcoin, also allows users to mine for profit. The paper will go beyond what is taught in class by attempting profiling of users. The first user will be browsing for, downloading and accessing Tor, and related sites. Our second user mines for Litecoins and our third user has bought or sold Litecoins.

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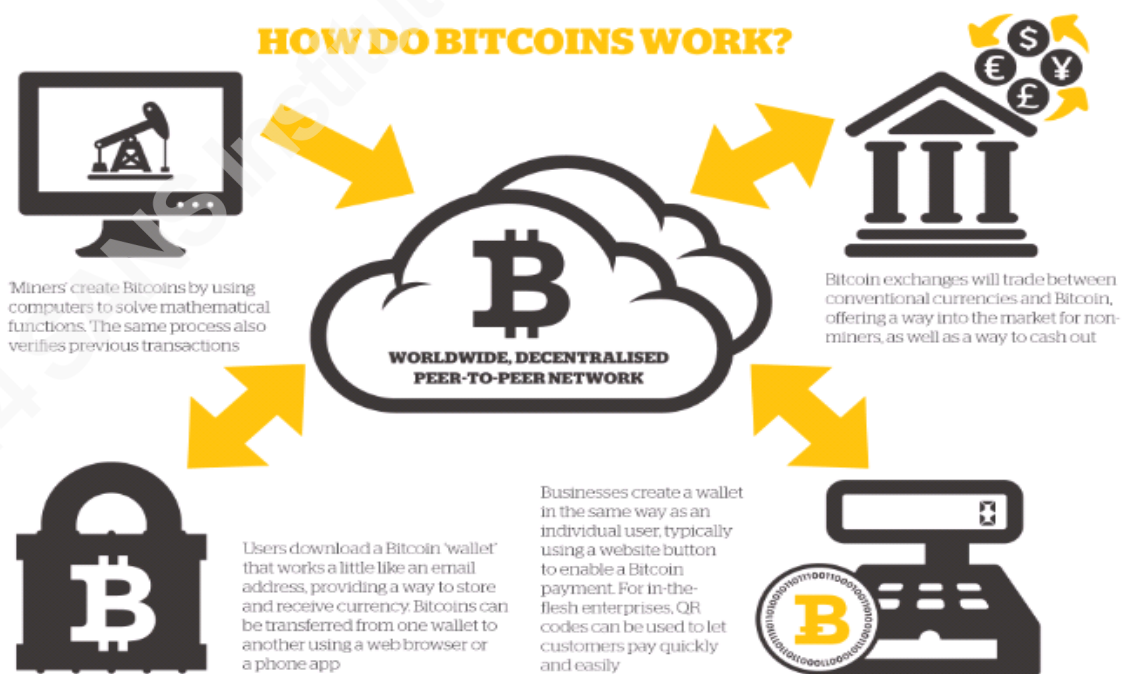
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## 1. Introduction to Virtual/Crypto Currencies

Litecoin is a virtual peer-to-peer currency. Introduced 7 October 2011 (Wikipedia 2014) it follows Bitcoin, first introduced 3 January 2009 (Wikipedia 2014). Virtual currencies offer the possibility of anonymity to those seeking to move currency between the physical and virtual worlds. Examples could be:

- Someone trying to hide money.
- Speculators.
- Someone trying to buy illicit goods on the internet.
- Someone trying to hide an exchange of goods or money.

Litecoin is, according to Kashmir (2014), one of the most lucrative in terms of speculations with respect to financial gains. Crypto currencies are not currently straight forward to purchase for the average user. Here is an example of Bitcoin/Litecoin:



**Figure AAT Comment, 2013 Bitcoin: what is it and how does it work?.**

## 1.1. The Exchanges – Converting Physical Currency to Virtual Currency

First of all the user has to find a way of changing their currency in the real world into a virtual currency. For this they need the equivalent of a foreign exchange service. On the internet these exchanges are currently unregulated. They also sit in different geographical locations and are therefore covered by different legal jurisdictions.

To do the exchange some sites require identification which could lead to users giving away more personal information than they would normally do. Once you have converted the money into virtual currency the user then needs to decide where and how to store it electronically. Once in an electronic format the virtual currency needs to be adequately protected with encryption, password and backed up. Some users arrange to exchange at an agreed price on line on the various exchanges and then meet in person to exchange cash.

Indeed, Coutts (2013) describes how users must first purchase Bitcoins to then be able to purchase Litecoins. However, this is not the case as exchanges exist to buy and sell the currency. One such site is <https://litecoinlocal.org/> which will be examined in this paper with some example transactions.

## 1.2. The Peer-to-peer client

The peer-to-peer client (P2P) is the software which connects the user to the network to facilitate a transaction between two individuals without an exchange. All transactions are processed by each client. When you open your P2P program it updates itself from the network with all the transactions that make up the currency ledger. The client is also used to send and receive payments.

Haid (2013) discusses the use of Tor and virtual private networks for anonymity by those seeking to hide their identity. Virtual currencies have publicly available ledgers known to all the peer-to-peer participants. Therefore an audit trail of transactions should be possible to retrieve forensically from various sources. Anonymity will continue to be an issue until such time that physical identity can be tied to transactions.

Jules (2013) looks at anonymity and Bitcoins. This article confirms the issue around the audit trail of a transaction. Whilst it discusses using Tor for anonymity there are still points at which someone who wishes to remain anonymous has to trust another party.

### 1.3. Mining

Litecoin has distinct advantages over Bitcoin. Payments cannot only be processed quicker but mining is more efficient. Moreover, Litecoin can produce four times the quantity of a virtual currency compared with Bitcoin. Perhaps most importantly Litecoin can be mined by the average user whereas Bitcoin has now reached a stage where the average user is priced out of the mining market in terms of hardware, power and cooling required to mine for Bitcoins. (Wikipedia 2014)

As at 7 January 2014 Litecoin was trading at \$25, and Bitcoin at \$929. As Bitcoin increases in value, does it make Litecoin increasingly attractive and accessible to speculators?

Businesses and employers need to prepare for and be aware of the risk of malware and employees who could use company resources for mining for their own personal gain. Malware and organised criminals could also use corporation's resources and personal devices for mining. These resources might be in house, or cloud based such as Amazon web services. One example which was highlighted in 2013 was Chadwick (2013) whose Amazon cloud monthly spend went from \$69 to \$3493 after his account was hijacked by a hacker and utilized for mining.

Google has recently found applications in its play store which when installed on android devices, mine for crypto currencies. Smith (2014) found that of two applications one had been downloaded "1 to 5 million times". In the code there was mining going on in the background on the device. The phones that were infected with the mining malware were found in Kirk (2014) to overheat or suffer a battery drain.

### 1.4. Digital Wallet

Whichever crypto currency is being investigated one of the key files to identify is *wallet.dat* which is where the "physical cryptographic private key file is stored" (Heid,

Daniel Piggott, Piggott.daniel@gmail.com



2013). This file could be crucial to a forensic examiner and provide a quick way of identifying if other artifacts might exist. An examiner might also find a trail leading to a USB or other data storage device where the *wallet.dat* may be held offline to protect the data on it. With virtual currency applications being available for mobile devices as well this file could be located anywhere. A forensic examiner should consider all devices if trying to locate it. Malware may be of interest to forensic examiners as well with it being used by criminals to attempt to steal *wallet.dat* from user's devices (Barker, 2014). This malware could be general malware such as a phishing attempt to gain access to a user's machine. This could then call a further command and control server to pull down customised malware that looks for *wallet.dat*. It could be specifically built malware designed purely to look for virtual currency files. As well as personal wallets, businesses which accept digital payments may have a business wallet.

### **1.5. Example of the user process to do a transaction**

Note this is after the user (Alice) having gone through the exchange. Alice has changed her cash from physical or virtual and downloaded her virtual coins to her wallet. So the user has already exchanged physical currency into virtual currency. Alice then downloads the Litecoin client and installs it on her device. Alice then exchanges her public address with Bob which in turn then allows Alice to receive 5 Litecoins from Bob. Finally, Alice places her Litecoins in her digital currency *wallet.dat* file:

1. Alice creates a new address in her P2P software. Here is a Litecoin example address (string of 33 characters) that gets created.
2. LVXXmgcVYBZAuiJM3V99uG48o3yG89h2Ph
3. Alice gives the address (string) to bob so he can make payment to it.
4. Bob opens his digital wallet on his machine, enters his encryption key and instructs the wallet to transfer 5 Litecoins to the address given him by Alice.
5. Bob then has the peer-to-peer client sign the transaction with the private key of the address from where he is transferring the Litecoins.
6. The transaction is broadcast to the peer-to-peer network and is verified and updated to the global ledger of transactions.

Daniel Piggott, Piggott.daniel@gmail.com

7. Alice receives her Litecoins.

As transactions are public, they can be searched using this site

<http://explorer.litecoin.net/>.

## Summary

Magnet Forensics has recently incorporated Bitcoin artifacts in their forensic product – Internet Evidence Finder (IEF). This paper will not look at mining. Instead, it is interested in looking for Litecoin artifacts or pointers to where evidence may be lurking when examining cases involving virtual currencies.

Sandvik (2013) looked at forensic artifacts left by Tor on OS X, Linux and Windows 7. The Tor version used was 2.3.25-6. The summary of the paper was to identify artifacts left behind by the installation, use and removal of a Tor package. Sandvik (2013) did not use a browser to install Tor but downloaded the program and installed it.

This paper seeks to investigate this evolving field and conduct research using three scenarios:

Scenario 1 – A user has a Windows 8 laptop, has installed Firefox, with no script add-on and Tor on the laptop. They have browsed for “Utopia” and browsed the site but have not made any purchases. They have browsed various Litecoin currency exchanges.

Scenario 2 – A user has a Windows 7 laptop, has installed the Litecoin application. This then connects on the peer-to-peer platform to assist in currency transactions. The Litecoin setup program is from <https://litecoin.org/>.

Scenario 3 – A user has used a Windows 7 laptop to buy Litecoins through a Litecoin currency website. The user does not have the peer-to-peer program installed and neither have they used any tool to hide their anonymity.

A record of the dates and times of the actions taken in the above scenarios can be found in (section 2.3). For scenario three a summary of the live trades, (appendix 6.1.7), breakdown of each trade, (appendix 6.1.8 – 6.1.12) and a full email trail (appendix 6.1.13) can be found. For example, when the Litecoins were purchased through a regular

Daniel Piggott, Piggott.daniel@gmail.com

browser, there is an audit trail. This will allow forensic tool findings to be confirmed later when it becomes important to validate our tools results.

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## 2. Test Schedule

For validation of the testing there is a record below of the equipment utilised along with the operating system and the scenario it relates to. The methodology covers the approach to setting up the artifacts in preparation for the forensic tool.

The actions taken will assist drawing conclusions from the test results through verification of artifacts and related timestamps.

### 2.1. Equipment utilised

The following equipment that was used for the analysis is as follows:

Scenario 1 - Clean Windows 8 SP1 Professional 64 bit laptop

Scenario 2 - Used Windows 7 SP1 Professional 64 bit laptop – running Litecoin but not mining

Scenario 3 - Used Windows 7 SP1 Professional 32 bit laptop – having already purchased Litecoins through P2P site <https://litecoinlocal.org/>.

### 2.2. Methodology

The methodology was to act as a normal user would do so that artifacts would be created to test the forensic tool. It is difficult to define a normal user as everyone is different. However, by using the three scenarios one would be able to obtain slightly different results.

Scenario 1 – The methodology was to test what results Tor would hide in terms of forensic analysis of a user's behaviour. The user would simply download and install the Tor browser. They would then activate the program and browse for virtual currency websites. Originally it was planned to use the Silk Road website but the site was subsequently taken down by law enforcement. Given the nature of Tor and the obvious interest of law enforcement in its use testing was limited to ensure just basic searches were performed.

Scenario 2 – The original methodology was to have a user who mined virtual currency. However, this was more involved and required greater processing

power so the methodology was changed to a user who is partaking in the peer-to-peer network of a virtual currency.

Scenario 3 – Our final user is our most active. One wanted to create the majority of “noise” in terms of forensic artifacts. To do this, real transactions were carried out on genuine sites on the internet. Physical currency was changed into virtual currency. The methodology being that the transactions would be identifiable forensically and allow a forensic investigator to trace transactions made.

## **2.3. Actions Taken**

### **2.3.1 Scenario 1**

#### **2.3.1.1 Scenario 1 – Windows 8 laptop**

The date and time were recorded - 5<sup>th</sup> February 2014 12:09.

Internet Explorer web browser that was part of the original installation of the new machine was opened.

Next, [www.duckduckgo.com](http://www.duckduckgo.com) was entered as the website address in Internet Explorer. This was followed by entering a search for “Tor browser”.

The Tor browser version 3.5.1 for Windows was downloaded.

Then, browsing to the downloaded Tor file a default installation is actioned taking all the default steps.

With the Tor browser installed, the following search term was entered: “*Litecoin*”.

The website results were listed and “*litecoinrates.com*” was viewed. Time recorded at 12:21.

Next the following search terms were actioned one by one: “*buy Litecoin*”, “*buy Litecoin UK*”, “*buy Litecoin UK exchange*”, “*Litecoin local*”.

Interestingly, when “*litecoinlocal.org*” was next viewed, the default location was set to France. The default location (France) was being picked up from the random Internet Protocol (IP) address which Tor allocated to give anonymity. This is by design and was outside the scope of this paper to warrant further investigation.

Daniel Piggott, Piggott.daniel@gmail.com

The blog “*mainstreamlos.blogspot.de*” was viewed and time recorded at 12:33.

Then the search term “Utopia” was entered and viewed “<http://ggvow6fj3sehlm45.onion>”.

Finally at 12:40 the Tor browser was closed.

### **2.3.1.2 Scenario 1 – Windows 8 laptop – Forensic Capture**

The date and time were recorded - 16<sup>th</sup> March 2014 09:53.

Our forensic tool Internet Evidence Finder Triage runs from a USB stick. This was plugged into this machine. Magnet Forensics product was then run from the USB device and a full capture was actioned. This capture is not a bit by bit disk copy but a low-level sector scan by the tool that then builds its own database file.

## **2.3.2 Scenario 2**

### **2.3.2.1 Scenario 2 – Windows 7 laptop – running Litecoin program**

The date and time were recorded – 6<sup>th</sup> December 2013 20:01.

Internet Explorer was opened on the machine and a search for “*Litecoin*” was entered from the default Google search page.

Litecoin version 0.8.5.1 was downloaded and installed.

Litecoin was then run on the machine and left running so that it could download the transaction table for the peer-to-peer virtual currency network. Once the transactions had caught up the Litecoin program was closed and the machine was powered off.

The date and time were recorded – 13th January 2014 10:11.

Internet Explorer was opened on the machine and a search for “*Litecoin*” was entered from the default Google search page.

Litecoin version 0.8.6.2 was downloaded and installed. Hashes of this program version were taken and these can be found in Section 6.1.5. Screen dumps were also taken of all the files extracted for this installation and can be found in Section 6.1.4.

Daniel Piggott, Piggott.daniel@gmail.com

Litecoin was then run on the machine and left running so that it could download the transaction table for the peer-to-peer virtual currency network. Once the transactions had caught up the Litecoin program was closed and the machine was powered off.

### **2.3.2.2 Scenario 2 – Windows 7 laptop – Forensic Capture**

The date and time were recorded - 16<sup>th</sup> March 2014 09:53.

Our forensic tool Internet Evidence Finder Triage runs from a USB stick. This was plugged into this machine. Magnet Forensics product was then run from the USB device and a full capture was actioned. This capture is not a bit-by-bit disk copy but a low-level sector scan by the tool that then builds its own database file.

### **2.3.3 Scenario 3**

#### **2.3.3.1 Scenario 3 – Windows 7 laptop – Purchasing Litecoins**

The date was recorded – 6<sup>th</sup> December 2013.

The internet was browsed to the website [litecoinlocal.org](http://litecoinlocal.org).

A purchase was made on [litecoinlocal.org](http://litecoinlocal.org).

The date was recorded – 17<sup>th</sup> December 2013

The internet was browsed to the website [litecoinlocal.org](http://litecoinlocal.org).

A purchase was made on [litecoinlocal.org](http://litecoinlocal.org).

The date was recorded – 18<sup>th</sup> December 2013

The internet was browsed to the website [litecoinlocal.org](http://litecoinlocal.org).

A purchase was made on [litecoinlocal.org](http://litecoinlocal.org)

#### **2.3.3.2 Scenario 3 – Windows 7 laptop – Forensic Capture**

The date and time were recorded – 4<sup>th</sup> April 2014 14:27.

Our forensic tool Internet Evidence Finder Triage runs from a USB stick. This was plugged into this machine. Magnet Forensics product was then run from the USB device and a full capture was actioned. This capture is not a bit by bit disk copy but a low-level sector scan by the tool that then builds its own database file.

Daniel Piggott, Piggott.daniel@gmail.com

## 2.4. Analysis

Now there is a forensic capture for each scenario. This is the evidence and artifacts being sought after from each scenario:

### Scenario 1:

Our user downloaded and installed Tor as described in Methodology 3.2. Our search will be looking for web history artifacts relating to Tor.. We are also looking for search terms entered with the Tor browser. We are also looking for any virtual currency artifacts our forensic tool finds on the machine to see if our user has any traces of using virtual currency.

### Scenario 2:

Our user downloaded and installed the Litecoin program as described in Methodology 3.2. We are looking for forensic artifacts that indicate use of a peer-to-peer virtual currency network. Looking for other artifacts such as websites visited in relation to virtual currencies will help differentiate between our third scenario. In our third scenario Litecoins have been purchased but not in this scenario. It will be good to compare.

### Scenario 3:

Our user has purchased virtual currency in this scenario as described in Methodology 3.2 Therefore we will be looking for web artifacts, storage of the virtual currency. In particular we will be interested as to how the trades were made, when they were made and perhaps most importantly who with and where the forensic artifacts can be found.



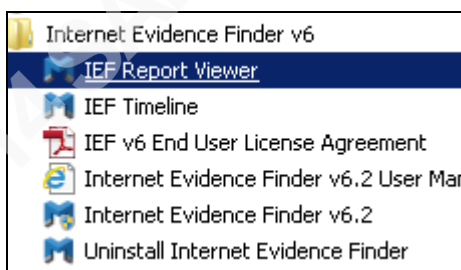
### 2.4.1. Scenario 1 - Win 8 Laptop Analysis of Capture

Following the actions taken there is now a forensic capture by our forensic tool Internet Evidence Finder (IEF). The log file for this capture can be found in Section 6.1.14. This file simply details the partitions on the disk that were scanned, the options selected for the scan and the artifacts found, broken down by category. It should be noted that false positives exist. Below (event 1) are the files produced on our USB forensic capture which are created by the forensic tool. For completeness of capture for this machine, the memory capture (.dmp) file was manually added.

 win8torproglaptopram.dmp	16/03/2014 10:53	DMP File	3,325,952 KB
 Bookmark	16/03/2014 10:56	Data Base File	0 KB
 tmpfc7c3ae2-83da-44a9-80bc-93d8da9bdfdd	16/03/2014 12:39	FLV File	1 KB
 Case Information	16/03/2014 14:38	Text Document	10 KB
 Filter	16/03/2014 15:33	Data Base File	1 KB
 IEFv6	16/03/2014 15:33	Data Base File	958,836 KB
 logging	16/03/2014 15:33	WinRAR ZIP archive	1 KB
 Search	16/03/2014 15:33	Data Base File	1 KB
 SearchAlerts	16/03/2014 15:33	Data Base File	1 KB

**Figure 1 - Files created by IEF Triage (event 1).**

Our next step to view the results was to launch the forensic programs report viewer. This was selected as below (event 2) from the standard Windows menu where our program was installed and selecting the IEF Report viewer.



**Figure 2 - Running IEF Report Viewer (event 2).**

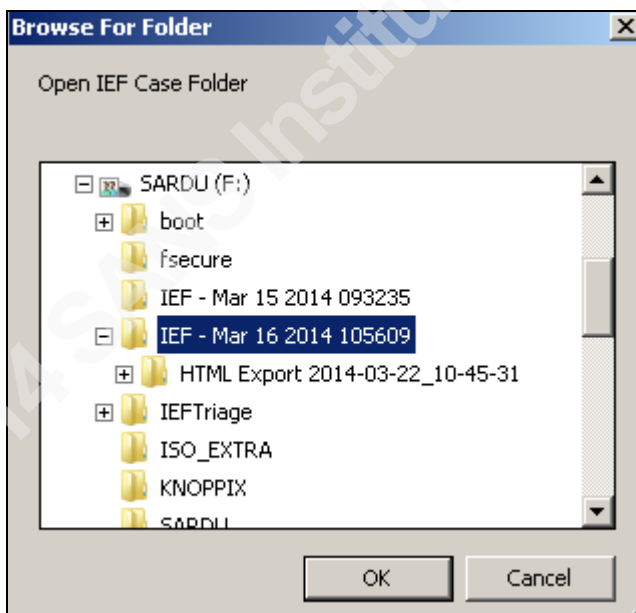
The report viewer as you can see from (event 3) then prompts for the forensic files you wish to examine by asking the user to click “here”.



**Figure 3 - Loading the IEF Triage file (event 3).**

Next click on the word “here” in (event 3).

This loads the standard Windows interface to browse for files as shown in (event 4).

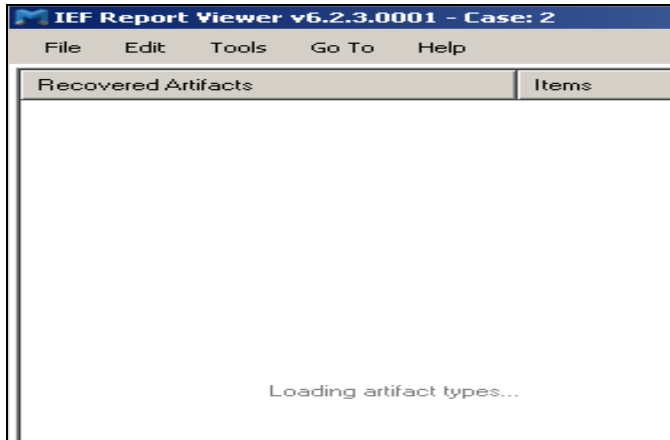


**Figure 4 - Navigating to the IEF Triage file source (event 4).**

Select our case file from our USB forensic storage dated March 16 and click on ok as in (event 4).

Daniel Piggott, Piggott.daniel@gmail.com

Then wait while the artifacts are loaded (event 5).



**Figure 5 - IEF Triage file loading the artifacts from the file source (event 5).**

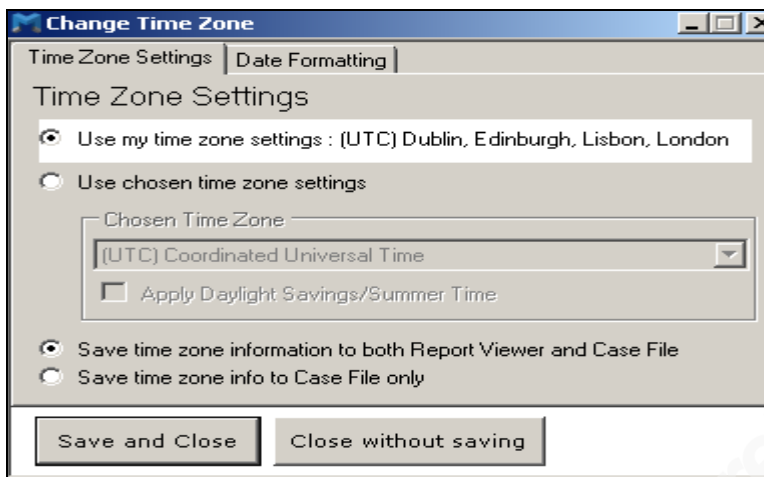
The tool presents a selection of artifacts sorted by this particular forensic tool's assessment heading (event 6).

	Pictures	60690
	Videos	802
	Social Networking	
	Facebook Chat	103
	Web Related	
	Browser Activity	7505
	Firefox Bookmarks	9
	Firefox Downloads	2
	Firefox Favicons	2
	Firefox Web History	2
	Flash Cookies	6
	IE InPrivate/Recovery URLs	73
	Internet Explorer 10-11 Content	104
	Internet Explorer 10-11 Daily/Week...	29
	Internet Explorer 10-11 Main History	50
	Safari Bookmarks	2

**Figure 6 - IEF Triage file listing of artifacts (event 6).**

Daniel Piggott, Piggott.daniel@gmail.com

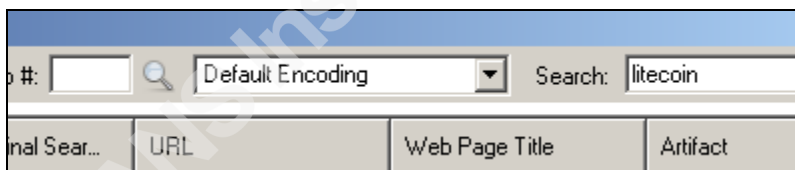
Next change the time zone to our geographic area where the image was taken from (event 7):



**Figure 7 - Changing IEF Triage Time Zone to match our forensic source (event 7).**

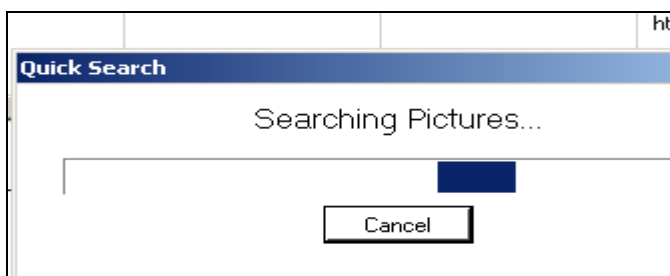
Changing the time settings is critical to any forensic examination to ensure timings are accurate.

Now we need to limit the artifacts to our particular investigation of Litecoin. You can limit the number of artifacts shown through the search facility. So a search term of “Litecoin” is entered in the search field (event 8).



**Figure 8 - Searching IEF Triage file (event 8).**

IEF then runs a search looking for Litecoin across the artifacts it has found (event 9).



**Figure 9 - IEF searching (event 9).**

Daniel Piggott, Piggott.daniel@gmail.com

Our search returns no results for the term “Litecoin” (event 10).



Figure 10 - No results from IEF Triage file search (event 10).

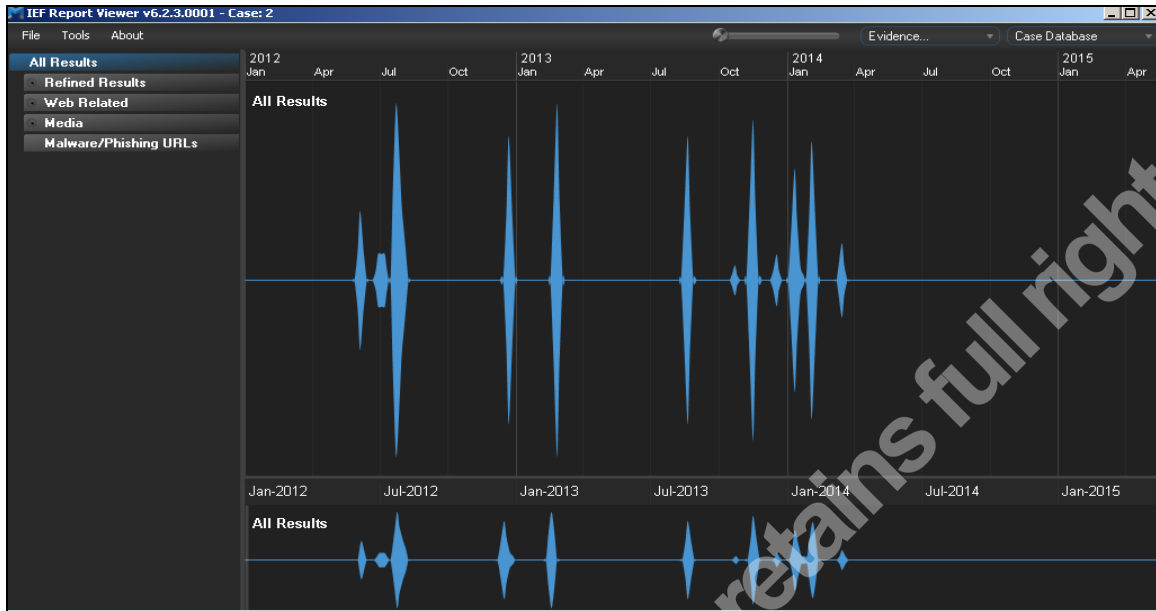
Next, run a timeline (event 11) of the artifacts found (event 2) to try and establish a pattern of use which should reflect our actions taken for Scenario 1.



Figure 11 - Running IEF Triage Timeline (event 11).

The tool then presents the timeline (event 12):

Daniel Piggott, Piggott.daniel@gmail.com



**Figure 12 - IEF Triage Timeline file (event 12).**

The timeline results look strange (event 12). The machine was purchased around 23 December 2013 but the timeline runs from 1<sup>st</sup> June 2012 to 16 March 2014?

This paper will not look further at this as there is a specific task to do, but it may warrant further investigation if evidence being sought is not found.

When clicking on a specific area of the timeline, it shows us the artifacts it has found and the period of these events (event 13).

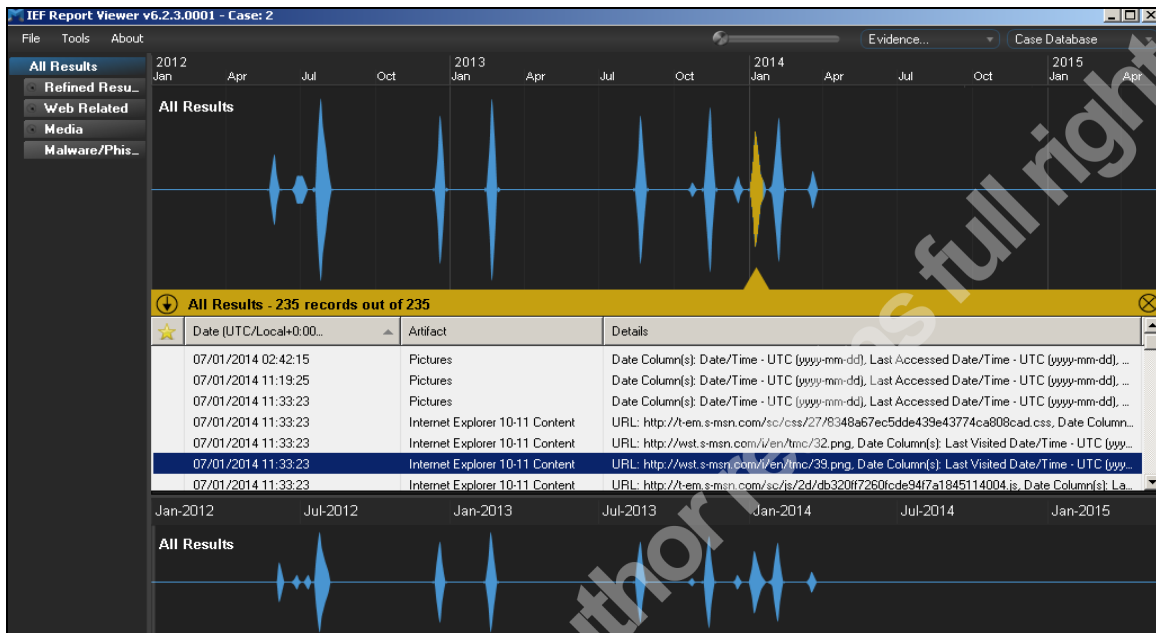


Figure 13 - Viewing correlated artifacts on the IEF Timeline (event 13).

In the example above there are 235 events with the majority on the 7 January 2014 but two on the 13 January 2014 (event 13).

The next largest group of artifacts moving forwards in time is represented by the tool with a large blue indicator.

Click on it to see a snapshot of the artifacts it represents (event 14).

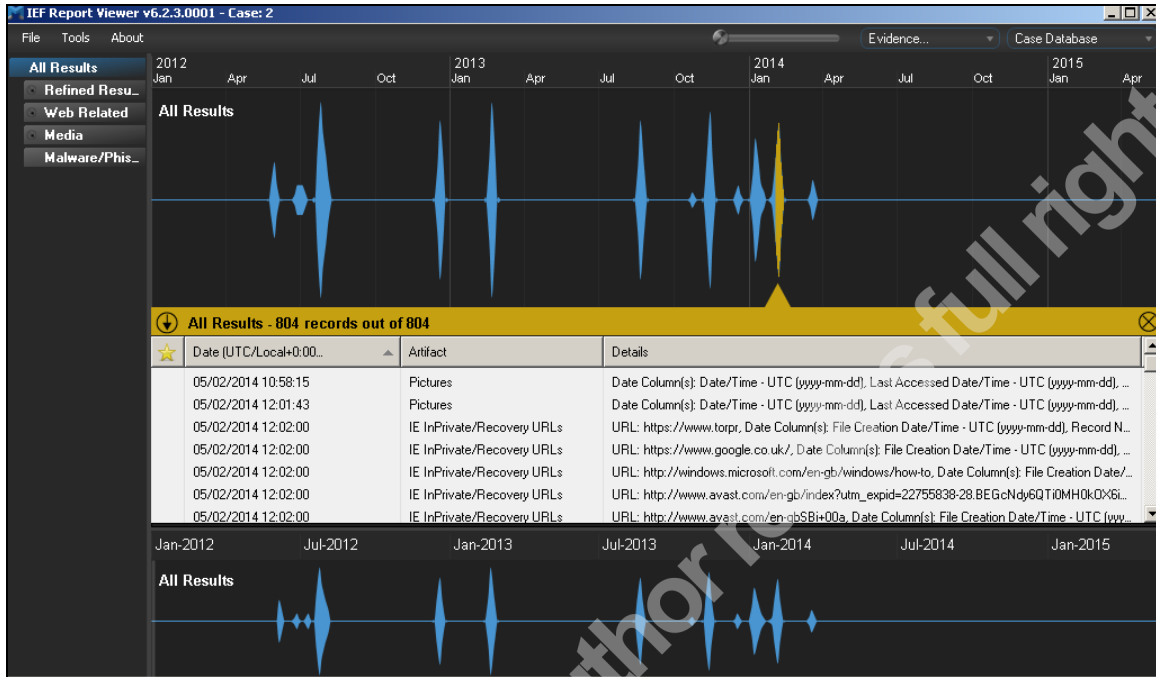


Figure 14 - Viewing correlated artifacts on the IEF Timeline from our actions (event 14).

There are 804 artifacts in the timeline period above (event 14).

Date (UTC/Local+0:00 dd-mm-yyyy)	Artifact	Details
05/02/2014 12:01:43	Pictures	Date Column(s): Date/Time - UTC (yyyy-mm-dd), Last Accessed Date/Time
05/02/2014 12:02:00	IE InPrivate/Recovery URLs	URL: https://www.torpr, Date Column(s): File Creation Date/Time - UTC (y...
05/02/2014 12:02:00	IE InPrivate/Recovery URLs	URL: https://www.google.co.uk/, Date Column(s): File Creation Date/Time

Figure 15 - Viewing Tor artifacts on the IEF Timeline from our actions (event 15).

In the timeline (event 15) one can see the first possible reference to Tor use on the machine. To validate this, a search for [www.torpr](http://www.torpr) is entered back on the main IEF screen (event 16).



Figure 16 - Searching for Tor artifacts (event 16).

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When the search is complete, IEF presents a list of 23 hits in our artifacts that can be investigated further (event 17).

Searched Artifacts	Items
Web Related	
Browser Activity	1
Firefox Bookmarks	1
Firefox Downloads	1
Firefox Web History	1
IE InPrivate/Recovery URLs	12
Internet Explorer 10-11 Daily/Week...	3
Internet Explorer 10-11 Main History	4

**Figure 17 - Hits found from a search for Tor (event 17).**

Web Related	
Browser Activity	1
Firefox Bookmarks	1
Firefox Downloads	1
Firefox Web History	1
IE InPrivate/Recovery URLs	12
Internet Explorer 10-11 Daily/Week...	3
Internet Explorer 10-11 Main History	4

https://www.torproject...	
URL	<a href="https://www.torproject.org/download/">https://www.torproject.org/download/</a>
User Agent	(not found)
Source	PhysicalDrive0 - Partition 4 (Microsoft NTFS, 100.38 GB) TI31036500A [C:] (All Files and Folders) - [ROOT]Users\davesmith\AppData\Local\Microsoft\Internet Explorer\Recovery\ImmersiveActive\{51A5F23B-8E5D-11E3-BE86-927942576D44}.dat
Located At	File offset 3313

**Figure 18 - First hit confirms an Internet Explorer artifact for the URL (event 18).**

Clicking on the first artifact in the list “Browser Action”, you now see a URL for the TOR download (<https://www.torproject.org/download/>) (event 18).

Also we have a user profile from our Windows machine – Dave Smith. (Event 18)

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#	URL	File Creation Date/Ti...	Local MAC Address	Source
7	https://www.torpr	05/02/2014 12:02:00	92-79-42-57-6D-44	PhysicalDrive0 - Pa
16	https://www.torproject.org/download/download-easy.html.en	05/02/2014 12:02:00	92-79-42-57-6D-44	PhysicalDrive0 - Pa
20	https://www.torprL	05/02/2014 12:02:00	92-79-42-57-6D-44	PhysicalDrive0 - Pa
22	https://www.torproject.org/	05/02/2014 12:02:00	92-79-42-57-6D-44	PhysicalDrive0 - Pa
40	https://www.torproject.org/download/download-easy.html.en"	05/02/2014 12:02:00	92-79-42-57-6D-44	PhysicalDrive0 - Pa
41	https://www.torproject.org/donate/thankyou	05/02/2014 12:02:00	92-79-42-57-6D-44	PhysicalDrive0 - Pa

**Figure 19 - Further hits confirming Internet Explorer artifacts for Tor (event 19).**

Using the menu on the left hand side you can browse the different artifacts found (event 19). The forensic tool adds a sequence number to the overall list of artifacts. These can be viewed, particularly our Tor artifacts, in time order (event 20).

#	URL	Description	File Creation Date/Ti...
7	https://www.torpr	-Not Found-	05/02/2014 12:02:00
16	https://www.torproject.org/download/download-easy.html.en	-Not Found-	05/02/2014 12:02:00
20	https://www.torprL	-Not Found-	05/02/2014 12:02:00
22	https://www.torproject.org/	-Not Found-	05/02/2014 12:02:00
40	https://www.torproject.org/download/download-easy.html.en"	-Not Found-	05/02/2014 12:02:00
41	https://www.torproject.org/donate/thankyou	-Not Found-	05/02/2014 12:02:00

#	User	URL	Last Visited Date/Ti...
38	davesmith	https://www.torproject.org/	05/02/2014 12:14:44
39	davesmith	https://www.torproject.org/dist/torbrowser/dist/torbrowser/3.5.1/torbrowser-install-3.5.1_en-US.exe	05/02/2014 12:15:14
40	davesmith	https://www.torproject.org/download/download/download-easy.html.en	05/02/2014 12:14:59
41	davesmith	https://www.torproject.org/download/download-easy.html.en	05/02/2014 12:15:01

#	User	URL	Last Visited Date/Ti...
9	davesmith	https://www.torproject.org/download/download-easy.html.en	2014-02-05 12:15:01
10	davesmith	https://www.torproject.org/	2014-02-05 12:14:44
18	davesmith	:Host: www.torproject.org	2014-02-05 12:14:44

★	#	Title	URL	Date Added Date/Ti...	Last Modified Date/...	Bookmark Type
	1	Learn more about Tor	https://www.torproject.org/	05/02/2014 12:18:52	05/02/2014 12:18:52	Bookmark Item

**Figure 20 - Tor related artifacts in time order (event 20).**

The timeline (event 14) so far shows us related activity between 5/2/14 12:01:43 and 5/2/14 12:40:25.

In Scenario 1 search terms were entered into the Tor web browser in an attempt to create artifacts. These search terms were then entered in our forensic tool to search for artifacts (event 21):

- Litecoin
- Buy
- UK
- Exchange
- Local
- Mainstreamlos.blogspot.de
- http://ggvow6fj3sehlm45.onion

★	#	Search Term	Search E...	URL	Web Page Ti...	Artifact	Art
	1	tf		http://t{(subdomain).tiles.virtualearth.net/tiles/dp/content?p=tf&a={quadkey}	n/a	Browser Activity	15
	2	my ip	Bing	http://www.bing.com/search?q=my+ip&form=IE10TR&src=IE10TR&pc=MATMJS	-Not Found-	IE InPrivate/Recovery URLs	3
	3	my ip	Bing	http://www.bing.com/search?q=my+ip&form=IE10TR&src=IE10TR&pc=MATMJS	-Not Found-	IE InPrivate/Recovery URLs	17
	4	tor		https://duckduckgo.com/?q=tor	-Not Found-	IE InPrivate/Recovery URLs	19
	5	anti virus windows 8	Google	https://www.google.co.uk/#q=anti+virus+windows+8	-Not Found-	IE InPrivate/Recovery URLs	28
	6	CAA	Google	https://googleads.g.doubleclick.net/pagead/dit/si?p=CAA&ut=AFAXlQAAAAAU...	-Not Found-	IE InPrivate/Recovery URLs	45
	7	tor		https://duckduckgo.com/?q=tor		Internet Explorer 10-11 Main ...	11
	8	my ip	Bing	http://www.bing.com/search?q=my+ip&form=IE10TR&src=IE10TR&pc=MATMJS		Internet Explorer 10-11 Main ...	36
	9	tor		https://duckduckgo.com/?q=tor		Internet Explorer 10-11 Daily...	21
	10	my ip	Bing	http://www.bing.com/search?q=my+ip&form=IE10TR&src=IE10TR&pc=MATMJS		Internet Explorer 10-11 Daily...	29

**Figure 21 - Search query validation of actions taken (event 21).**

All our test searches return a negative response and show no artifacts. Finally a search for *wallet.dat* is entered as we are looking for virtual currency activity on this machine. This also returns a negative response and shows no artifacts found.

Daniel Piggott, Piggott.daniel@gmail.com

## 2.4.2. Scenario 2 - Win 7 Laptop (running Litecoin) Analysis of Capture

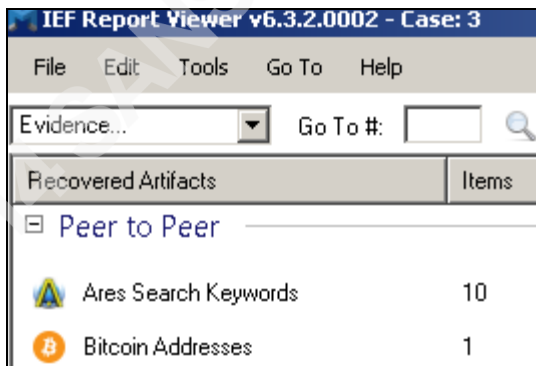
Following our actions taken we now have a forensic capture by our forensic tool Internet Evidence Finder (IEF). The log file for this capture can be found in Section 6.1.15. This file simply details the partitions on the disk that were scanned, the options selected for the scan and the artifacts found, broken down by category. It should be noted that false positives exist. Below (event 1) are the files produced on our USB forensic capture which are created by the forensic. For completeness of capture for this machine, the memory capture (.dmp) file was added manually.

After IEF Triage has completed these are the capture files (event 22):

 Bookmark	23/03/2014 11:14	Data Base File	0 KB
 Case Information	24/03/2014 22:14	Text Document	9 KB
 IEFCase	25/03/2014 06:37	IEF6 File	22 KB
 Filter	25/03/2014 06:37	Data Base File	1 KB
 IEFv6	25/03/2014 06:37	Data Base File	2,106,305 KB
 Search	25/03/2014 06:37	Data Base File	1 KB
 SearchAlerts	25/03/2014 06:37	Data Base File	1 KB
 logging	25/03/2014 06:37	WinRAR ZIP archive	1 KB

**Figure 22 - Files created by IEF Triage (event 22).**

The report viewer is then run (event 2) and the case folder loaded (event 3) above (event 22) is selected. IEF then loads the artifacts (event 6).



**Figure 23 - Bitcoin artifact hit (event 23).**

IEF has found what it thinks is a Bitcoin artifact (event 23).

★	▲	Address	Stat...	Public Key	Encrypted Private Key
	1	LRwHGzqaMQ7ai9fKu4XQATzfKQWEXQ4SAw	Active	-Not Found-	-Not Found-

Figure 24 - Bitcoin artifact hit (event 24).

<b>Address</b>	LRwHGzqaMQ7ai9fKu4XQATzfKQWEXQ4SAw
<b>Label</b>	(not found)
<b>Status</b>	Active
<b>Public Key</b>	-Not Found-
<b>Encrypted Private Key</b>	-Not Found-
<b>Source</b>	PhysicalDrive0 - Partition 2 (Microsoft NTFS, 297.99 GB) [C:] (All Files and Folders) [ROOT]\Users\switch2it\AppData\Roaming\Litecoin\wallet.dat
<b>Located At</b>	File Offset 53283
<b>Evidence Number</b>	Physical Disk 0

Figure 25 - Bitcoin artifact hit (event 25).

IEF has located one virtual currency Litecoin artifact (event 24,25). This is the *wallet.dat* file commonly associated with peer-to-peer currencies.

Next doing a search of “Litecoin” across all the artifacts IEF has found on our disk (event 26).

The screenshot shows the IEF Report Viewer interface. The search bar at the top contains the text "litecoin". On the left, a tree view under "Recovered Artifacts" shows "Peer to Peer" expanded, with "Bitcoin Addresses" selected, indicating 1 item. A "Quick Search" dialog box is overlaid on the main window, with the text "Searching Internet Explorer Cache Records..." and a "Cancel" button.

Figure 26 - Search for Litecoin artifacts (event 26).

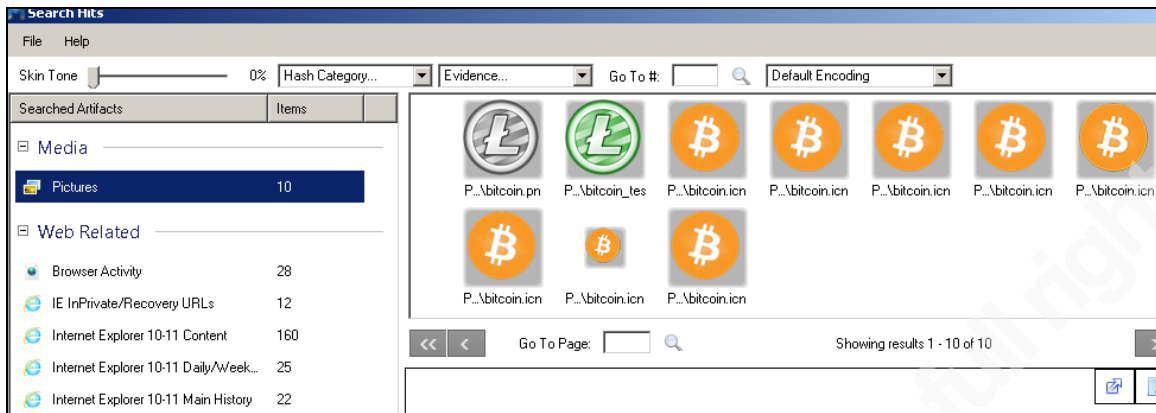


Figure 27 - Results of a Bitcoin search parameter in IEF (event 27).

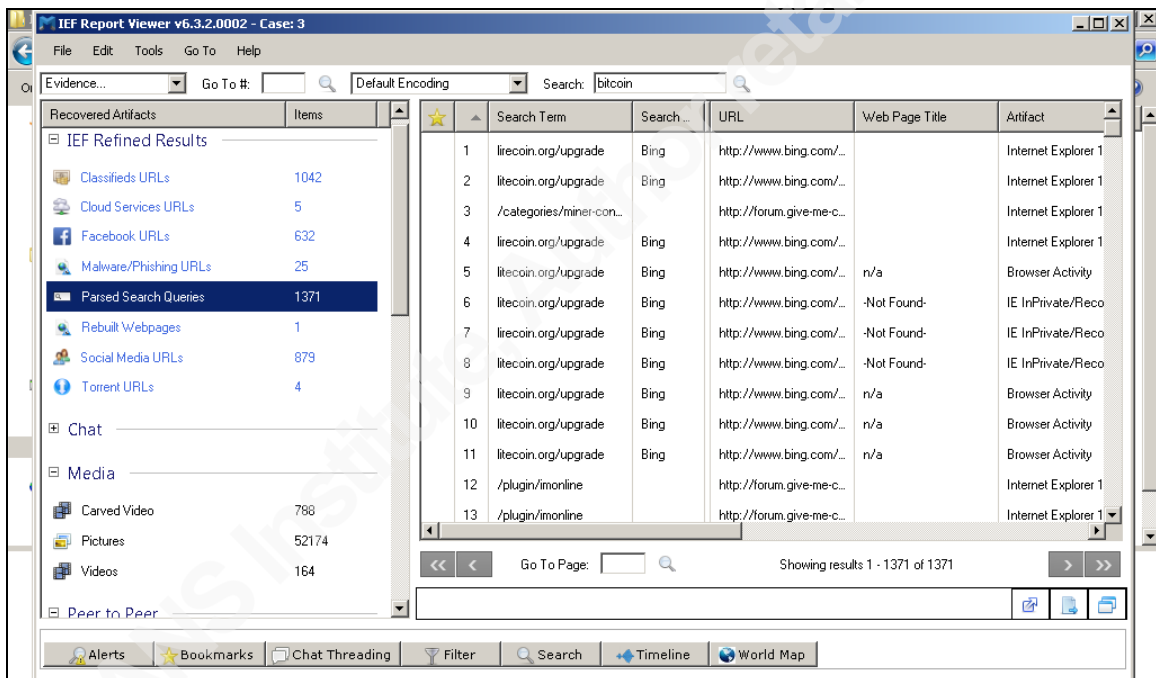


Figure 28 - Results of a Bitcoin search parameter in IEF (event 28).

We can see from entering Bitcoin as a search parameter that the forensic tool still gives us other virtual currency artifacts (event27/28). The Litecoin and Bitcoin images could suggest a peer-to-peer currency program has been installed at some point (event 27).

Furthermore, we can see “Litecoin.org/upgrade” URL entries suggesting a user has been looking at the upgrade page for the Litecoin client on the Litecoin website [www.litecoin.org](http://www.litecoin.org) (event 28).

The screenshot shows a 'Search Hits' window with a table of search results. The table has columns for Search Term, Search Engine, URL, Web Page Title, Artifact, and Artifact ID. The search terms include 'litecoin.org/upgrade' and 'litecoin mining'. The search engines used are Bing and Google. The artifacts are categorized as 'Internet Explorer 10-11 ...' and 'Browser Activity'.

Search Term	Search Engine	URL	Web Page Title	Artifact	Artifact ID
litecoin.org/upgrade	Bing	http://www.bing.com/...		Internet Explorer 10-11 ...	2
litecoin.org/upgrade	Bing	http://www.bing.com/...	n/a	Browser Activity	276
litecoin.org/upgrade	Bing	http://www.bing.com/...	-Not Found-	IE InPrivate/Recovery ...	20
litecoin.org/upgrade	Bing	http://www.bing.com/...	-Not Found-	IE InPrivate/Recovery ...	22
litecoin.org/upgrade	Bing	http://www.bing.com/...	n/a	Browser Activity	325
litecoin.org/upgrade	Bing	http://www.bing.com/...	n/a	Browser Activity	326
litecoin.org/upgrade	Bing	http://www.bing.com/...	n/a	Browser Activity	328
litecoin	Google	https://www.google.c...	-Not Found-	IE InPrivate/Recovery ...	105
litecoin mining	Google	https://www.google.c...	-Not Found-	IE InPrivate/Recovery ...	109
litecoin mining	Google	https://www.google.c...	-Not Found-	IE InPrivate/Recovery ...	119
litecoin mining pool	Google	https://www.google.c...	-Not Found-	IE InPrivate/Recovery ...	123
litecoin mining	Google	https://www.google.c...	-Not Found-	IE InPrivate/Recovery ...	178
litecoin	Google	https://www.google.c...	-Not Found-	IE InPrivate/Recovery ...	561

Figure 29 - Results of a Litecoin search parameter in IEF (event 29).

Looking at the search queries that have been entered one can see artifacts found by the forensic tool. These entries have been entered into Internet Explorer. One can identify “*Litecoin*”, “*Litecoin mining*”, *Litecoin mining pool*”. (Event 29).

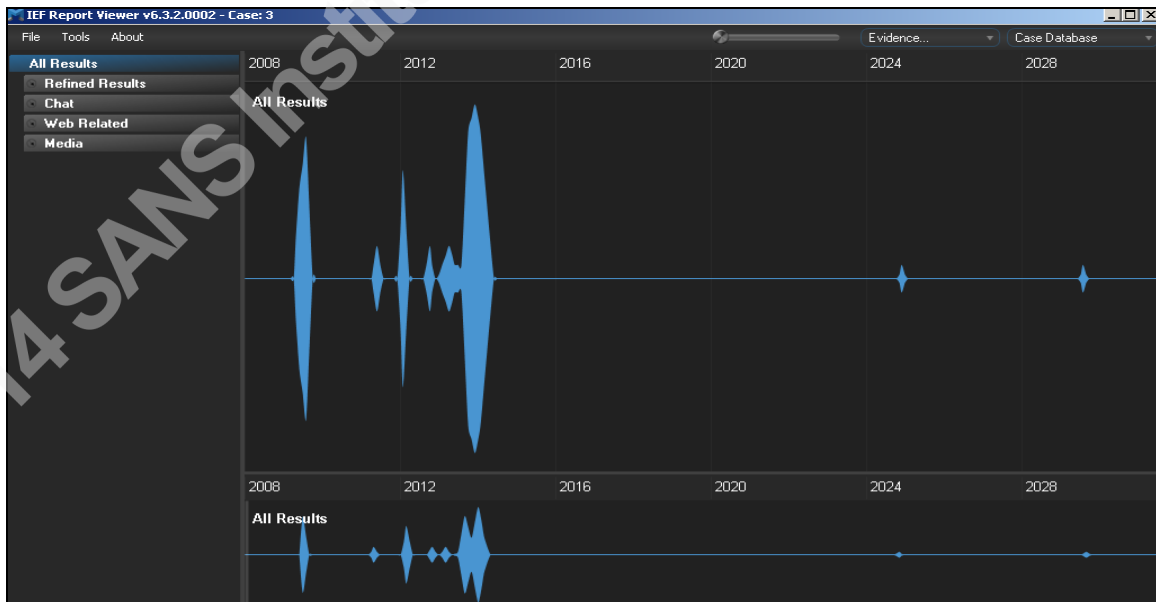
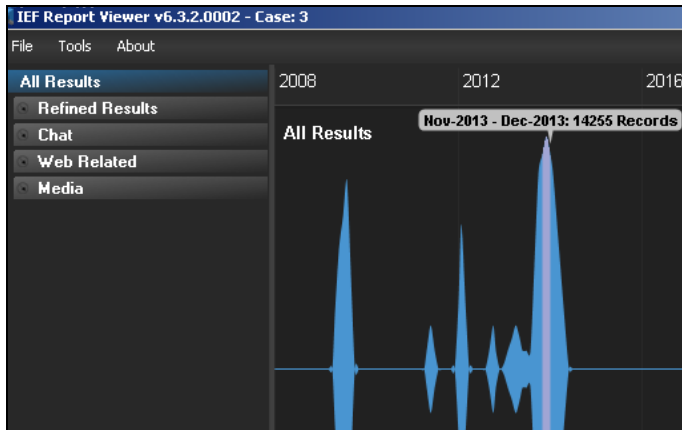


Figure 30 - Results of Timeline for this machine (event 30).

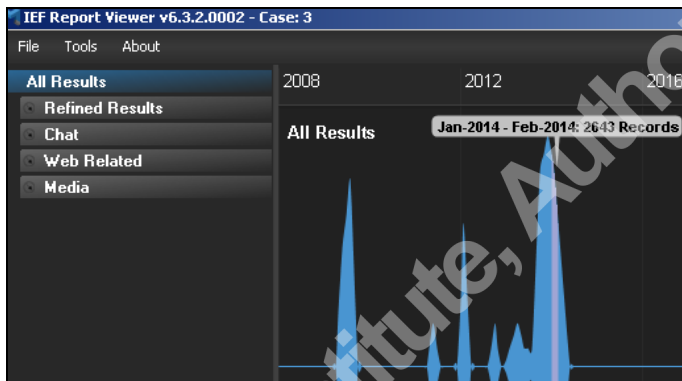
The timeline shows the testing activity with a large blue oval on this machine (event 30):

Daniel Piggott, Piggott.daniel@gmail.com



**Figure 31 - Results of Timeline records for this machine (event 31).**

Comparing our actions taken: Scenario 2 on the 6<sup>th</sup> December 2013 (event 31).

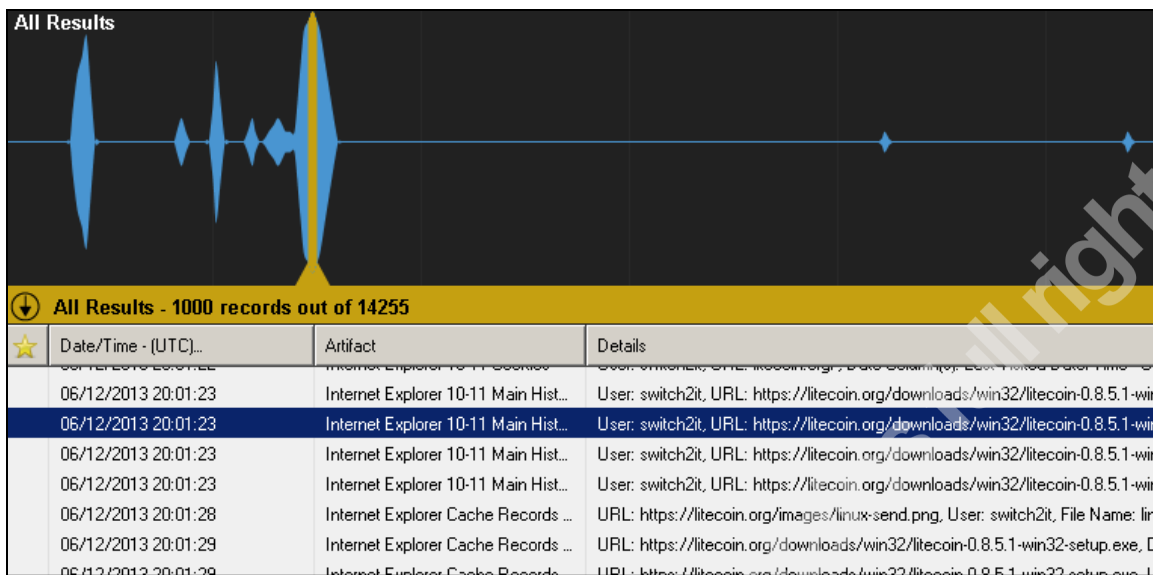


**Figure 32 - Results of Timeline records for this machine (event 32).**

Then comparing our actions taken: Scenario 2 on the 13<sup>th</sup> January (event 32).

Our testing activity was actioned on the 6<sup>th</sup> December 2013 and 13 January 2014. Our timeline is consistent in that it shows many artifacts around this period. Now to investigate the detail.






**Figure 33 - Download of Litecoin-0.8.5.1 for Windows platform (event 33).**

Looking in more depth (event 33) one can see the time matches the actions taken where Litecoin version 0.8.5.1 was downloaded. One can also see the executable file that was downloaded as Litecoin-0.8.5.1-win32-setup.exe.

### 2.4.3. Scenario 3 - Win 7 Laptop (Purchase Litecoins) Analysis of Capture

Following our actions taken there is now a forensic capture by our forensic tool Internet Evidence Finder (IEF). The log file for this capture can be found in Section 6.1.16. This file simply details the partitions on the disk that were scanned, the options selected for the scan and the artifacts found, broken down by category. It should be noted that false positives exist. Below (event 34) are the files produced on our USB forensic capture which are created by the forensic. For completeness of capture for this machine, the memory capture (.dmp) file was added manually. This machine is where it is expected to find the most activity from our actions taken.

 IEFv6	07/04/2014 12:31	Data Base File	4,194,303 KB
 IEFv6.db-shm	07/04/2014 12:26	DB-SHM File	17,664 KB
 SearchAlerts.db-wal	07/04/2014 12:20	DB-WAL File	0 KB
 logging	07/04/2014 12:16	Compressed (zippe...	1 KB
 IEFv6.db-wal	07/04/2014 12:14	DB-WAL File	2,310,598 KB
 Case Information	07/04/2014 11:58	Text Document	12 KB
 IEFCase	07/04/2014 11:58	IEF6 File	22 KB

**Figure 34 - Files created by IEF Triage (event 34).**

The report viewer is then run (event 2), the case folder loaded (event 3), IEF then loads the artifacts (event 6) and Timezone changed (event 7).

On loading the artifacts, there is an immediate Bitcoin artifact “hit” on this machine as well (event 35):

1	LWG4UUeBnezKFD83d5w4szLF4CBAkZkbGV	Active	-Not Found-	-Not Found-	Pl
<p>Go To Page: <input type="text"/> Showing results 1 - 1 of 1</p>					
<b>Address</b>	LWG4UUeBnezKFD83d5w4szLF4CBAkZkbGV				
<b>Label</b>	(not found)				
<b>Status</b>	Active				
<b>Public Key</b>	-Not Found-				
<b>Encrypted Private Key</b>	-Not Found-				
<b>Source</b>	PhysicalDrive0 - Partition 1 (Microsoft NTFS, 141.55 GB) T1102717P0A [C:] (All Files and Folders) - [ROOT]\Users\dm\AppData\Roaming\Litecoin\wallet.dat				
<b>Located At</b>	File Offset 58035				

Figure 35 - Files created by IEF Triage (event 35).

On our test machine the file structure that is left by the install of the Litecoin client (event 36) is then investigated further. Here one can clearly see the *wallet.dat* file. There is also a *peers.dat* file that holds a list of IP addresses that the program connects to through the peer-to-peer virtual currency network.

Name ^	Date modified	Type	Size
blocks	06/12/2013 16:14	File folder	
chainstate	06/12/2013 16:13	File folder	
.lock	06/12/2013 16:12	LOCK File	0 KB
db	06/12/2013 16:12	Text Document	0 KB
debug	06/12/2013 19:39	Text Document	197 KB
peers.dat	06/12/2013 19:39	DAT File	2 KB
wallet.dat	06/12/2013 19:34	DAT File	88 KB

Figure 36 - Files created by Litecoin install (event 36).

For the purpose of this project the hashes of the *peers.dat* and *wallet.dat* files were taken.

MD5 Hash of *wallet.dat*      3c928c5f6cf53338fde30b563c98ccbf

SHA1 Hash of *wallet.dat*      dc798f70c9694a8ccdad1b3dffc087ff91c740b

MD5 Hash of *peers.dat*      fbe71c09d316f156d924cbcd662104ea

SHA1 Hash of *peers.dat*      71ed864680383e05c22ccd4cbee2f7fd4ba01359

Next another search is then actioned for “Litecoin” across the artifacts:

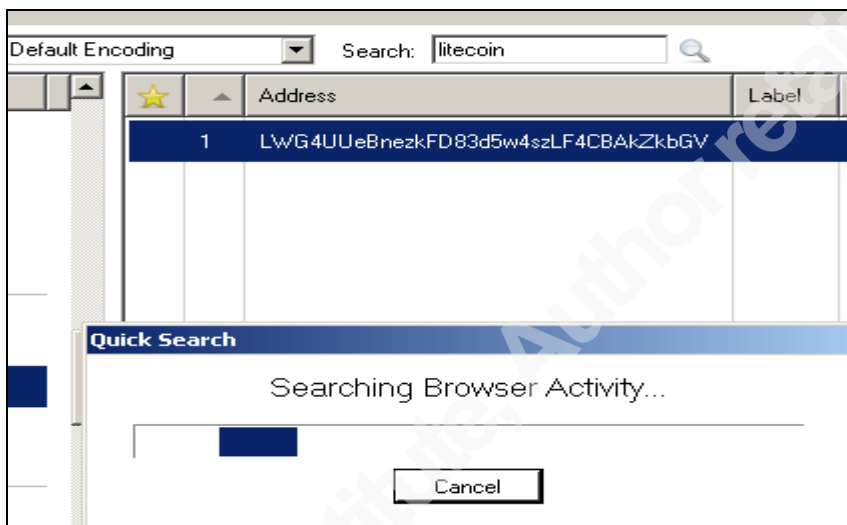


Figure 37 - Artifact search for “Litecoin” (event 37).

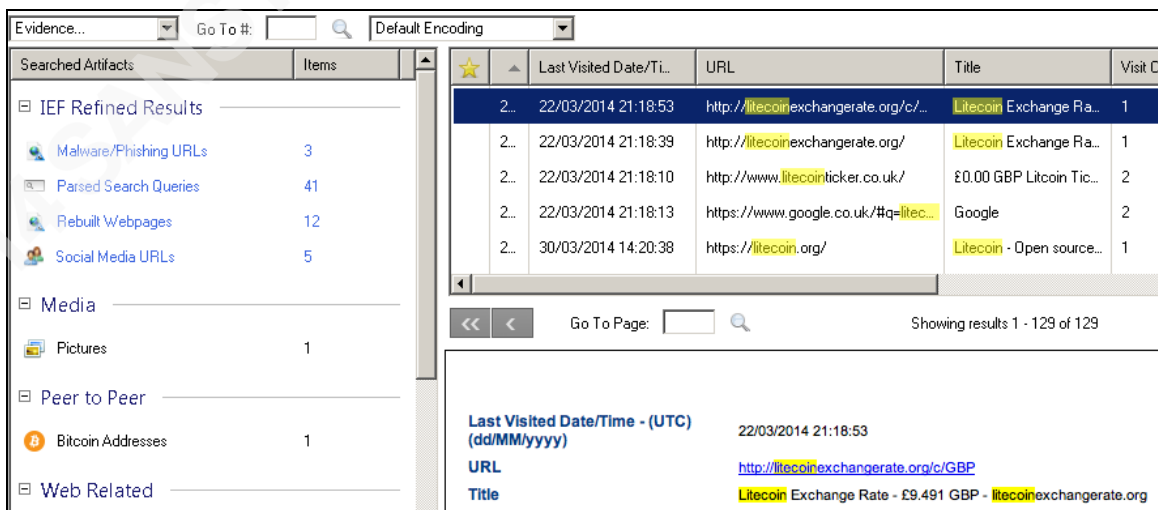


Figure 38 - Artifact search result for “Litecoin” (event 38).

Daniel Piggott, Piggott.daniel@gmail.com

There are many hits for Litecoin (event 37, 38) as expected. Therefore, we move to the timeline to give us more information.

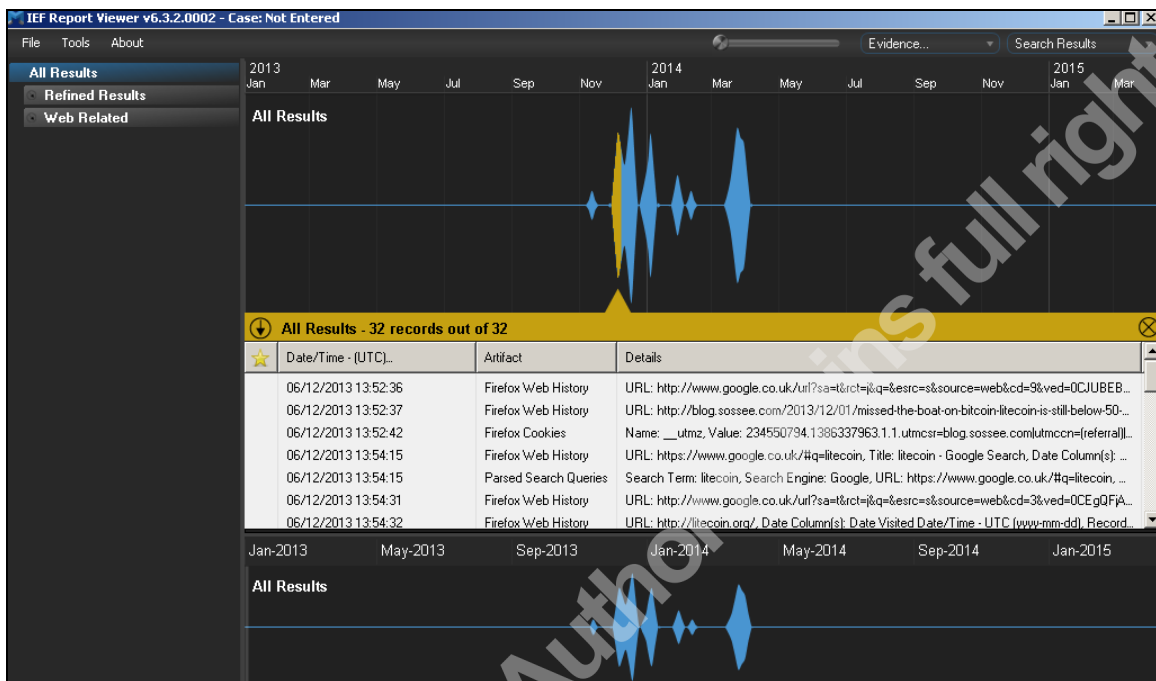


Figure 39 - Timeline of Artifact search result for “Litecoin” (event 39).

Studying the timeline the following events are recorded in the following periods (event 39), based in our “Litecoin” search:

3 <sup>rd</sup> – 8 <sup>th</sup> December 2013	32 artifacts
9 <sup>th</sup> – 14 <sup>th</sup> December 2013	7 artifacts
15 <sup>th</sup> – 20 <sup>th</sup> December 2013	125 artifacts
27 <sup>th</sup> December – 1 <sup>st</sup> January 2014	2 artifacts
2 <sup>nd</sup> January – 7 <sup>th</sup> January 2014	36 artifacts
26 <sup>th</sup> January – 31 <sup>st</sup> January 2014	3 artifacts
7 <sup>th</sup> February – 12 <sup>th</sup> February 2014	1 artifact
15 <sup>th</sup> March – 20 <sup>th</sup> March 2014	2 artifacts
21 <sup>st</sup> March – 26 <sup>th</sup> March 2014	41 artifacts
27 <sup>th</sup> March – 2 <sup>nd</sup> April 2014	17 artifacts

Daniel Piggott, Piggott.daniel@gmail.com

For the purpose of this paper the highlighted dates, consistent with our actions taken with the most artifacts are of interest.

Looking at the timeline for the 3<sup>rd</sup> to the 8<sup>th</sup> December 2013 these entries are of interest (event 40).

All Results - 32 records out of 32		
Date/Time - (UTC)...	Artifact	Details
06/12/2013 20:27:06	Chrome/360 Safe Bro...	URL: https://litecoinlocal.org/index.php?pinset=1, Title: LitecoinLocal.org - Date Column(s): La
06/12/2013 20:29:08	Chrome/360 Safe Bro...	URL: https://litecoinlocal.org/trade.php?id=1940, Title: LitecoinLocal - Trade, Date Column(s)
06/12/2013 20:49:03	Chrome/360 Safe Bro...	URL: http://uselitecoin.com/, Title: UseLitecoin - the ultimate litecoin sites directory, Date Co
06/12/2013 20:56:50	Chrome/360 Safe Bro...	URL: https://litecoinlocal.org/viewtrade.php?id=6279&paid=1, Title: LitecoinLocal.org - View
06/12/2013 21:02:29	Chrome/360 Safe Bro...	URL: https://litecoin.info/Mining_pool_comparison#Reward_types, Title: Mining pool compar

Figure 40 - Artifact showing a possible Litecoin transaction (event 40).

There is an interesting “view trade” URL (event 41):

All Results - 32 records out of 32		
Date/Time - (UTC)...	Artifact	Details
06/12/2013 20:27:06	Chrome/360 Safe Bro...	URL: https://litecoinlocal.org/index.php?pinset=1, Title: Liteco
06/12/2013 20:29:08	Chrome/360 Safe Bro...	URL: https://litecoinlocal.org/trade.php?id=1940, Title: Litecoi
06/12/2013 20:49:03	Chrome/360 Safe Bro...	URL: http://uselitecoin.com/, Title: UseLitecoin - the ultimate l
06/12/2013 20:56:50	Chrome/360 Safe Bro...	URL: https://litecoinlocal.org/viewtrade.php?id=6279&paid=1,

Figure 41 - Artifact showing a possible Litecoin trade (event 41).

All Results - 32 records out of 32		
Date/Time - (UTC)...	Artifact	Details
06/12/2013 22:15:33	Chrome/360 Safe Bro...	URL: https://www.google.co.uk/#q=bitcoin+giving+surnames, Title: Google, Date Column(s): Last Vis
06/12/2013 22:29:37	Chrome/360 Safe Bro...	URL: https://litecoinlocal.org/user.php?id=1791, Title: LitecoinLocal.org - User Profile for p192837465
06/12/2013 22:30:39	Chrome/360 Safe Bro...	URL: https://litecoinlocal.org/trade.php?id=1637, Title: LitecoinLocal - Trade, Date Column(s): Last Vi
06/12/2013 22:31:34	Chrome/360 Safe Bro...	URL: https://litecointalk.org/index.php?PHPSESSID=hih3tqqbkujne38sa482sn46k7&topic=9027.0, T
06/12/2013 23:18:01	Chrome/360 Safe Bro...	URL: https://litecoin.info/Mining_pool_comparison#Difficulty, Title: Mining pool comparison - Litecoin
06/12/2013 23:22:16	Chrome/360 Safe Bro...	URL: https://litecoin.info/Mining hardware comparison, Title: Mining hardware comparison - Litecoin

Figure 42 - Artifact showing a possible Litecoin trade and user id (event 42).

There are no more trade references in this timeframe and know from our actions taken that our last trade was 22:30:39 that matches the timeline.

Taking a look at the LitecoinLocal.org website (event43), we can see what LitecoinLocal.org is and what it can be used for.

**Figure 43 - Checking URL artifact on the internet – (event 43).**

Looking at the timeline for the 15<sup>th</sup> to the 20<sup>th</sup> December 2013, these entries are of interest.

All Results - 125 records out of 125		
Date/Time - (UTC)...	Artifact	Details
17/12/2013 12:41:02	Chrome/360 Safe Browser Carve...	URL: https://litecoinlocal.org/index.php?topic=6245.msg72505#msg72505, Title: LitecoinLocal - Trade, Date Column(s): Last Visited Date
17/12/2013 12:42:26	Chrome/360 Safe Browser Carve...	URL: https://litecoinlocal.org/trade.php?id=2516, Title: LitecoinLocal - Trade, Date Column(s): Last Visited Date

**Figure 44 - Artifact showing a possible Litecoin trade and user id (event 44).**

17/12/2013 13:14:00	Chrome/360 Safe Browser ...	URL: https://litecoinlocal.org/user.php?id=1060, Title: LitecoinLocal.org - User Profile for ScottJ
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**Figure 45 - Artifact showing a possible Litecoin trade and user id and username (event 45).**

17/12/2013 14:29:21	Chrome/360 Safe Browser ...	URL: https://litecoinlocal.org/viewtrade.php?id=7607&cancel=1, Title: LitecoinLocal.org - View Trade #7607, Date Column(s): Last Visited Date
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**Figure 46 - Artifact showing a possible Litecoin trade cancellation (event 46).**

Date/Time - (UTC)...	Artifact	Details
18/12/2013 09:19:44	Chrome...	URL: https://litecoinlocal.org/viewtrade.php?id=7607, Title: LitecoinLocal.org - View Trade #7607, Date Column(s): Last Visited Date
18/12/2013 09:21:28	Chrome...	URL: https://litecoinlocal.org/viewtrade.php?id=7743, Title: LitecoinLocal.org - View Trade #7743, Date Column(s): Last Visited Date
18/12/2013 09:21:36	Chrome...	URL: https://litecoinlocal.org/viewtrade.php?id=7743&cancel=1, Title: LitecoinLocal.org - View Trade #7743, Date Column(s): Last Visited Date
18/12/2013 09:22:09	Chrome...	URL: https://litecoinlocal.org/trade.php?id=2553, Title: LitecoinLocal - Trade, Date Column(s): Last Visited Date
18/12/2013 09:23:14	Chrome...	URL: https://litecoinlocal.org/viewtrade.php?id=6279, Title: LitecoinLocal.org - View Trade #6279, Date Column(s): Last Visited Date
18/12/2013 09:23:21	Chrome...	URL: https://litecoinlocal.org/user.php?id=1025, Title: LitecoinLocal.org - User Profile for Lewwardington, Date Column(s): Last Visited Date
18/12/2013 09:27:06	Chrome...	URL: https://litecoinlocal.org/trade.php?id=2083, Title: LitecoinLocal - Trade, Date Column(s): Last Visited Date

Date/Time - (UTC)...	Artifact	Details
18/12/2013 09:28:33	Chrome...	URL: https://litecointalk.org/index.php?topic=10186.0, Title: Security do's and don'ts thread. Please read and
18/12/2013 09:29:55	Chrome...	URL: https://litecoinlocal.org/index.php?board=81.0.html, Title: LitecoinLocal.org, Date Column(s): Last Visited D
18/12/2013 09:30:06	Chrome...	URL: https://litecointalk.org/index.php?action=search2, Title: Search Results, Date Column(s): Last Visited D
18/12/2013 09:30:13	Chrome...	URL: https://litecointalk.org/index.php?topic=8814.msg63868#msg63868, Title: cant withdraw, Date Column(s):
18/12/2013 09:31:17	Chrome...	URL: https://litecoinlocal.org/buy.php, Title: LitecoinLocal.org - Buy litecoins, Date Column(s): Last Visited D
18/12/2013 09:32:23	Chrome...	URL: https://litecoinlocal.org/user.php?id=4250, Title: LitecoinLocal.org - User Profile for ulius88, Date Column(s):
18/12/2013 09:32:27	Chrome...	URL: https://litecoinlocal.org/trade.php?id=1868, Title: LitecoinLocal.org - Trade, Date Column(s): Last Visited D
18/12/2013 09:32:33	Chrome...	URL: https://litecoinlocal.org/buy.php?payment=online, Title: LitecoinLocal.org - Buy litecoins, Date Column(s)

Date/Time - (UTC)...	Artifact	Details
18/12/2013 09:33:08	Chrome...	URL: https://litecoinlocal.org/trade.php?id=2789, Title: LitecoinLocal.org - Trade, Date Column(s): Last Visited Dat
18/12/2013 09:33:25	Chrome...	URL: https://litecoinlocal.org/trade.php, Title: LitecoinLocal.org - Trade, Date Column(s): Last Visited Date/Time - ..
18/12/2013 10:01:57	Chrome...	URL: https://litecoinlocal.org/wallet.php, Title: LitecoinLocal.org - Wallet, Date Column(s): Last Visited Date/Ti
18/12/2013 10:04:35	Chrome...	URL: https://litecoinlocal.org/trades.php, Title: View Trades - LitecoinLocal.org, Date Column(s): Last Visited Da
18/12/2013 10:12:30	Chrome...	URL: https://litecoinlocal.org/viewtrade.php?id=7747&paid=1, Title: LitecoinLocal.org - View Trade #7747, Dat
18/12/2013 10:14:03	Chrome...	URL: https://litecoinlocal.org/viewtrade.php, Title: LitecoinLocal.org - View Trade #7747, Date Column(s): Last
18/12/2013 10:21:33	Chrome...	URL: https://litecoinlocal.org/login.php, Title: LitecoinLocal.org - View Trade #7747, Date Column(s): Last Visit
18/12/2013 10:21:51	Chrome...	URL: https://litecoinlocal.org/viewtrade.php?id=7747, Title: LitecoinLocal.org - View Trade #7747, Date Colum

18/12/2013 10:22:01	Chrome...	URL: https://litecoinlocal.org/index.php, Title: LitecoinLocal.org, Date Column(s): Last Visited Date/Time - UTC
18/12/2013 10:22:01	Chrome...	URL: https://litecoinlocal.org/logout.php, Title: LitecoinLocal.org, Date Column(s): Last Visited Date/Time - UTC

**Figure 47 - multiple artifacts showing possible Litecoin transactions (event 47).**

Knowing the actions that have been taken to generate these artifacts, this is the second trade as the timeline matches. There is a wealth of artifact information here and by studying these transactions one is able to identify usernames and the four digit numbers that make up a user ID. However, an investigator can also identify this just from browsing LitecoinLocal.org, as the information is present in the web page URL when you click on a user.



## 3. Results

### 3.1. Scenario 1

A user has a Windows 8 laptop, has installed Firefox, with no script add-on and Tor on the laptop. They have browsed for “Utopia” and browsed the site but have not made any purchases. They have browsed various Litecoin currency exchanges.

The steps taken on this machine were to download and install Tor. The artifacts found in Figure 14 show the Tor download. Figure 15 shows search strings entered in the browser in relation to Tor. However, what was not found were any artifacts in relation to search entries made by the user through the Tor browser once it was installed. By keeping a record of the actions taken, the search terms entered in the Tor browser were the same as were entered and no artifacts were matched by the forensic product.

Moving on to looking for Bitcoin artifacts, a search was actioned for *wallet.dat*. This was also not located on this machine and neither was any other Bitcoin or crypto currency artifacts known to the forensic program.

### 3.2. Scenario 2

A user has a Windows 7 laptop, has installed the Litecoin application.

The steps taken on this machine were to download and install Litecoin as a peer-to-peer program. This then participates in the Litecoin P2P community processing transactions when it is running on the machine.

On running the forensic tool on this machine, it immediately highlighted a Bitcoin artifact as seen in Figure 23.

Upon closer inspection, the tool seems to do this when it finds a file called *wallet.dat* which can be seen in Figure 25.

Once it was known that *wallet.dat* was on this system a search for “Litecoin” was entered to go over all the artifacts and pull out these. Figure 28 shows the artifact hits for “Litecoin”. There are various artifacts ranging from picture files to URLs and search queries in various browsers. Appendix 6.1.4 shows the icons and image files installed on a machine when the Litecoin install package runs. The download of the Litecoin

Daniel Piggott, Piggott.daniel@gmail.com

application can be seen in Figure 33 and this matches our download as documented in Appendix 6.1.2

### 3.3. Scenario 3

A user has used a Windows 7 laptop to buy Litecoins through a Litecoin currency website.

The forensic product again found on this laptop the file *wallet.dat* indicating the possible use of a crypto currency on this machine. Looking through the timeline artifacts in Figure 40 it clearly correlates with our Appendix 6.1.3. On the 6<sup>th</sup> December 2013, a trade was initiated with a user called lewardington on the website [litecoinlocal.org](http://litecoinlocal.org)

Looking at the transaction in more detail the trade was initiated at 20:30:52 on the 6<sup>th</sup> December 2013. The trade id can be seen in Appendix 6.1.7 which has a summary of the trades and in Appendix 6.1.8 for this specific trade. The Trade ID is 6279. Our forensic timeline in (event 40, 41) shows a machine user viewing this trade in the URL artifact.

## 4. Summary and Conclusion

Our results confirm that the use of Tor can present problems for forensic artifacts to be found in terms of activity. This was demonstrated in our first scenario on Windows 8. From a forensic perspective live memory analysis would be a next interesting area to investigate Tor. Our results can prove forensically that someone used a web browser to search for Tor and download the Tor browser bundle. A user then used Tor on the machine. Once the user was running the Tor browser the tool was unable to identify what actions were taken and proved in our search (event 21).

Virtual currency artifacts from the peer-to-peer Litecoin install demonstrated the download of Litecoin onto a machine and presence of crypto currency artifacts. However, other than that, to explore this further the key files of interest to a forensic investigator would be the *wallet.dat* and *peers.dat*.

*Peers.dat* contains connection information. This may assist in an investigation in terms of network connections to and from a machine participating on a peer-to-peer currency network.

The third test where four transactions, (two processed, two cancelled) have created a host of artifacts shows that cloud forensics is just as important to corroborate the tools findings. Litecoin and the open nature of transactions have allowed us to draw together transaction data from the forensic tool. This matches the actions taken. The key artifacts for an investigator would appear to be user.php web page URLs which contain user IDs in relation to the website Litecoininlocal.org. Trade IDs and the buy.php URL are also key artifacts but they do not always confirm a buying transaction. They merely demonstrate a possible intent to buy and need verifying with other artifacts.

Litecoinlocal.org holds a lot of information to corroborate user's activity on its site. Transaction parties are listed, as are all their trades and conversations.

In conclusion, an investigator would be interested in the artifacts, the online exchange website, the user's transactions through the online exchange and their Litecoin balance if one exists. *Wallet.dat* in this case was not used or taken off line, for example

Daniel Piggott, Piggott.daniel@gmail.com

on removable media, encrypted. Interestingly if the user removes the Litecoin application *wallet.dat* and *peers.dat* remain on the machine.

Technology offers the use of crypto currencies in a variety of ways in terms of purchasing and selling. The tools that exist would allow a user to do the following. A user who wishes to remain anonymous could take the following actions:

1. Download Tor onto a USB device.
2. Connect the USB device to a workstation of choice anywhere.
3. Browse to a crypto currency exchange and agree to meet in person and purchase for cash.
4. Connect the USB device to a different workstation of choice anywhere.
5. Browse to the crypto currency exchange and download currency to *wallet.dat* on the USB device.
6. Print the details of the private key of the wallet.
7. Lock the USB away or distribute the USB to others.
8. Repeat step 1 with a new USB device.

Further research in this area and consideration of the above may produce a quicker forensic process when looking for the potential use of crypto currency in forensic field.

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Daniel Piggott, Piggott.daniel@gmail.com

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Daniel Piggott, Piggott.daniel@gmail.com

## 6. Appendix

### 6.1. Test Environment & Software versions used

Magnet Forensics

Internet Evidence Finder v6.3.2.0002 – release 02/10/13, file size 11,328,344

MD5 - d12687d731934c34bcbf7c5a0e8563cd

SHA1 - e4ddd0d910fb998aa488c67c7780ee8a901f905b

Report Viewer v6.3.2.0002 – release 02/10/13, file size 2,949,968

MD5 - fa3a58d64d80caef51c63b5ee50f5164

SHA1 – 7d66b27f9d06aafeff618191ab43db95ce8dcc2d

Timeline version v6.3.2.0002 – release 02/10/13, file size 902,984

MD5 – 8c7e8c3e1ea6d281c1dcd3dc8dcc5d86

SHA1 - b87e36690162daed46eed68f0b19e2ce15ec680b

Litecoin version v0.8.5.1 – release 12/9/13, file size 13,633,097

MD5 - d816f8124b0caf4d939150bb4ad446ea

SHA1 - b67187d29d222d158aa69cc628d9b468713433c7

Litecoin version v0.8.6.2 – release 11/1/14, file size 13,227,723

MD5 – cea4df067f39ccac017a9ecc9616bf9d

SHA1 – 3c3a38aa97e55859d43a471e33618f6c08af2785

#### 6.1.1. Clean Windows 8 SP1 Professional 64 bit laptop

(1.6Ghz, 4GB, 128GB, NTFS)

Daniel Piggott, Piggott.daniel@gmail.com

### 6.1.2. Scenario 2 - Used Windows 7 SP1 Professional 64 bit laptop

(2Ghz, 2GB, 300GB, NFTS)

6/12/13 – 20:01 – Litecoin.qt 0.8.5.1 installed.

13/1/14 – 10:11 – Litecoin.qt 0.8.6.2 installed.

### 6.1.3. Scenario 3- Used Windows 7 SP1 Professional 32 bit laptop

(1.6Ghz, 2GB, 160GB, NFTS)

6/12/13 – Trade on Litecoin.local.org with lewwardington

17/12/13 – Password reset request for Litecoin.local.org

17/12/13 – Aborted trade Dialogue with Scottj on Litecoin.local.org

18/12/13 – Trade Litecoin.local.org with jpsdesign

### 6.1.4. Litecoin Windows Version 8.6.2 files extraction

Output folder: C:\Program Files\Litecoin  
 Extract: litecoin-qt.exe... 100%  
 Extract: COPYING.txt  
 Extract: readme.txt  
 Output folder: C:\Program Files\Litecoin\daemon  
 Extract: litecoind.exe  
 Output folder: C:\Program Files\Litecoin\src  
 Extract: addrman.cpp  
 Extract: addrman.h  
 Extract: alert.cpp  
 Extract: alert.h  
 Extract: allocators.h  
 Extract: base58.h  
 Extract: bignum.h  
 Extract: bitcoinrpc.cpp  
 Extract: bitcoinrpc.h  
 Extract: bloom.cpp  
 Extract: bloom.h  
 Extract: checkpoints.cpp  
 Extract: checkpoints.h

Daniel Piggott, Piggott.daniel@gmail.com



Extract: checkqueue.h  
Extract: clientversion.h  
Extract: coincontrol.h  
Extract: compat.h  
Extract: crypter.cpp  
Extract: crypter.h  
Extract: db.cpp  
Extract: db.h  
Extract: hash.cpp  
Extract: hash.h

Extract: init.cpp  
Extract: init.h  
Extract: key.cpp  
Extract: key.h  
Extract: keystore.cpp  
Extract: keystore.h  
Extract: leveldb.cpp  
Extract: leveldb.h  
Extract: limitedmap.h  
Extract: main.cpp

Extract: main.h  
Extract: makefile.linux-mingw  
Extract: makefile.mingw  
Extract: makefile.osx  
Extract: makefile.unix  
Extract: mruset.h  
Extract: net.cpp  
Extract: net.h  
Extract: netbase.cpp  
Extract: netbase.h

Extract: noui.cpp  
Extract: protocol.cpp  
Extract: protocol.h  
Extract: rpcblockchain.cpp  
Extract: rpcdump.cpp  
Extract: rpcmining.cpp  
Extract: rpcnet.cpp  
Extract: rpcrawtransaction.cpp  
Extract: rpcwallet.cpp  
Extract: script.cpp

Extract: script.h  
Extract: script-sse2.cpp  
Extract: script.cpp  
Extract: script.h  
Extract: serialize.h  
Extract: sync.cpp  
Extract: sync.h  
Extract: threadsafety.h  
Extract: txdb.cpp  
Extract: txdb.h

Extract: ui\_interface.h  
Extract: uint256.h  
Extract: util.cpp  
Extract: util.h  
Extract: version.cpp  
Extract: version.h  
Extract: wallet.cpp  
Extract: wallet.h  
Extract: walletdb.cpp  
Extract: walletdb.h

Output folder: C:\Program Files\Litecoin\src\json

Extract: LICENSE.txt  
Extract: json\_spirit.h  
Extract: json\_spirit\_error\_position.h  
Extract: json\_spirit\_reader.cpp  
Extract: json\_spirit\_reader.h  
Extract: json\_spirit\_reader\_template.h  
Extract: json\_spirit\_stream\_reader.h  
Extract: json\_spirit\_utils.h  
Extract: json\_spirit\_value.cpp

Extract: json\_spirit\_value.h  
Extract: json\_spirit\_writer.cpp  
Extract: json\_spirit\_writer.h  
Extract: json\_spirit\_writer\_template.h  
Output folder: C:\Program Files\Litecoin\src\leveldb  
Extract: .gignore  
Extract: AUTHORS  
Extract: LICENSE  
Extract: Makefile  
Extract: NEWS

Extract: README  
Extract: TODO  
Extract: WINDOWS.md  
Extract: build\_detect\_platform  
Output folder: C:\Program Files\Litecoin\src\leveldb\db  
Extract: autocompact\_test.cc  
Extract: builder.cc  
Extract: builder.h  
Extract: c.cc  
Extract: c\_test.c

Extract: corruption\_test.cc  
Extract: db\_bench.cc  
Extract: db\_impl.cc  
Extract: db\_impl.h  
Extract: db\_iter.cc  
Extract: db\_iter.h  
Extract: db\_test.cc  
Extract: dbformat.cc  
Extract: dbformat.h  
Extract: dbformat\_test.cc

---

Extract: filename.cc  
Extract: filename.h  
Extract: filename\_test.cc  
Extract: leveldb\_main.cc  
Extract: log\_format.h  
Extract: log\_reader.cc  
Extract: log\_reader.h  
Extract: log\_test.cc  
Extract: log\_writer.cc  
Extract: log\_writer.h

Extract: memtable.cc  
Extract: memtable.h  
Extract: repair.cc  
Extract: skiplist.h  
Extract: skiplist\_test.cc  
Extract: snapshot.h  
Extract: table\_cache.cc  
Extract: table\_cache.h  
Extract: version\_edit.cc  
Extract: version\_edit.h

Extract: version\_edit\_test.cc  
Extract: version\_set.cc  
Extract: version\_set.h  
Extract: version\_set\_test.cc  
Extract: write\_batch.cc  
Extract: write\_batch\_internal.h  
Extract: write\_batch\_test.cc  
Output folder: C:\Program Files\Litecoin\src\leveldb\doc  
Extract: benchmark.html  
Extract: doc.css

Extract: impl.html  
Extract: index.html  
Extract: log\_format.txt  
Extract: table\_format.txt  
Output folder: C:\Program Files\Litecoin\src\leveldb\doc\bench  
Extract: db\_bench\_sqlite3.cc  
Extract: db\_bench\_tree\_db.cc  
Output folder: C:\Program Files\Litecoin\src\leveldb\helpers  
Output folder: C:\Program Files\Litecoin\src\leveldb\helpers\memenv  
Extract: memenv.cc

Extract: memenv.h  
Extract: memenv\_test.cc  
Output folder: C:\Program Files\Litecoin\src\leveldb\include  
Output folder: C:\Program Files\Litecoin\src\leveldb\include\leveldb  
Extract: c.h  
Extract: cache.h  
Extract: comparator.h  
Extract: db.h  
Extract: env.h  
Extract: filter\_policy.h

Extract: iterator.h  
Extract: options.h  
Extract: slice.h  
Extract: status.h  
Extract: table.h  
Extract: table\_builder.h  
Extract: write\_batch.h  
Output folder: C:\Program Files\Litecoin\src\leveldb\issues  
Extract: issue178\_test.cc  
Output folder: C:\Program Files\Litecoin\src\leveldb\port

Extract: README  
Extract: atomic\_pointer.h  
Extract: port.h  
Extract: port\_example.h  
Extract: port\_posix.cc  
Extract: port\_posix.h  
Extract: port\_win.cc  
Extract: port\_win.h  
Extract: thread\_annotations.h  
Output folder: C:\Program Files\Litecoin\src\leveldb\port\win

Extract: stdint.h  
Output folder: C:\Program Files\Litecoin\src\leveldb\table  
Extract: block.cc  
Extract: block.h  
Extract: block\_builder.cc  
Extract: block\_builder.h  
Extract: filter\_block.cc  
Extract: filter\_block.h  
Extract: filter\_block\_test.cc  
Extract: format.cc

Extract: format.h  
Extract: iterator.cc  
Extract: iterator\_wrapper.h  
Extract: merger.cc  
Extract: merger.h  
Extract: table.cc  
Extract: table\_builder.cc  
Extract: table\_test.cc  
Extract: two\_level\_iterator.cc  
Extract: two\_level\_iterator.h

Output folder: C:\Program Files\Litecoin\src\leveldb\util  
Extract: arena.cc  
Extract: arena.h  
Extract: arena\_test.cc  
Extract: bloom.cc  
Extract: bloom\_test.cc  
Extract: cache.cc  
Extract: cache\_test.cc  
Extract: coding.cc  
Extract: coding.h

Extract: coding\_test.cc  
Extract: comparator.cc  
Extract: crc32c.cc  
Extract: crc32c.h  
Extract: crc32c\_test.cc  
Extract: env.cc  
Extract: env\_posix.cc  
Extract: env\_test.cc  
Extract: env\_win.cc  
Extract: filter\_policy.cc

Extract: hash.cc  
Extract: hash.h  
Extract: histogram.cc  
Extract: histogram.h  
Extract: logging.cc  
Extract: logging.h  
Extract: mutexlock.h  
Extract: options.cc  
Extract: posix\_logger.h  
Extract: random.h

Extract: status.cc  
Extract: testharness.cc  
Extract: testharness.h  
Extract: testutil.cc  
Extract: testutil.h  
Output folder: C:\Program Files\Litecoin\src\obj  
Extract: .gitignore  
Output folder: C:\Program Files\Litecoin\src\obj-test  
Extract: .gitignore  
Output folder: C:\Program Files\Litecoin\src\qt

Extract: aboutdialog.cpp  
Extract: aboutdialog.h  
Extract: addressbookpage.cpp  
Extract: addressbookpage.h  
Extract: addresstablemodel.cpp  
Extract: addresstablemodel.h  
Extract: askpassphrasedialog.cpp  
Extract: askpassphrasedialog.h  
Extract: bitcoin.cpp  
Extract: bitcoin.qrc

Extract: bitcoinaddressvalidator.cpp  
Extract: bitcoinaddressvalidator.h  
Extract: bitcoinamountfield.cpp  
Extract: bitcoinamountfield.h  
Extract: bitcoingui.cpp  
Extract: bitcoingui.h  
Extract: bitcoinstrings.cpp  
Extract: bitcoinunits.cpp  
Extract: bitcoinunits.h  
Extract: clientmodel.cpp

Extract: clientmodel.h  
Extract: coincontroldialog.cpp  
Extract: coincontroldialog.h  
Extract: coincontroltreewidget.cpp  
Extract: coincontroltreewidget.h  
Extract: csvmodelwriter.cpp  
Extract: csvmodelwriter.h  
Extract: editaddressdialog.cpp  
Extract: editaddressdialog.h  
Extract: guiconstants.h

Extract: guiutil.cpp  
Extract: guiutil.h  
Extract: maddockiconhandler.h  
Extract: maddockiconhandler.mm  
Extract: macnotificationhandler.h  
Extract: macnotificationhandler.mm  
Extract: monitoreddatamapper.cpp  
Extract: monitoreddatamapper.h  
Extract: notificador.cpp  
Extract: notificador.h

Extract: optionsdialog.cpp  
Extract: optionsdialog.h  
Extract: optionsmodel.cpp  
Extract: optionsmodel.h  
Extract: overviewpage.cpp  
Extract: overviewpage.h  
Extract: paymentserver.cpp  
Extract: paymentserver.h  
Extract: qrcoodedialog.cpp  
Extract: qrcoodedialog.h

Extract: qvalidatedlineedit.cpp  
Extract: qvalidatedlineedit.h  
Extract: qvaluecombobox.cpp  
Extract: qvaluecombobox.h  
Extract: rpcconsole.cpp  
Extract: rpcconsole.h  
Extract: sendcoinsdialog.cpp  
Extract: sendcoinsdialog.h  
Extract: sendcoinsentry.cpp  
Extract: sendcoinsentry.h

Extract: signverifymessagedialog.cpp  
Extract: signverifymessagedialog.h  
Extract: splashscreen.cpp  
Extract: splashscreen.h  
Extract: transactiondesc.cpp  
Extract: transactiondesc.h  
Extract: transactiondescdialog.cpp  
Extract: transactiondescdialog.h  
Extract: transactionfilterproxy.cpp  
Extract: transactionfilterproxy.h

Extract: transactionrecord.cpp  
Extract: transactionrecord.h  
Extract: transactiontablemodel.cpp  
Extract: transactiontablemodel.h  
Extract: transactionview.cpp  
Extract: transactionview.h  
Extract: walletframe.cpp  
Extract: walletframe.h  
Extract: walletmodel.cpp  
Extract: walletmodel.h

Extract: walletstack.cpp  
Extract: walletstack.h  
Extract: walletview.cpp  
Extract: walletview.h  
Output folder: C:\Program Files\Litecoin\src\qt\forms  
Extract: aboutdialog.ui  
Extract: addressbookpage.ui  
Extract: askpassphrasedialog.ui  
Extract: coincontroldialog.ui  
Extract: editaddressdialog.ui



Extract: optionsdialog.ui  
Extract: overviewpage.ui  
Extract: qrcoodedialog.ui  
Extract: rpccconsole.ui  
Extract: sendcoinsdialog.ui  
Extract: sendcoinsentry.ui  
Extract: signverifymessagedialog.ui  
Extract: transactiondescdialog.ui  
Output folder: C:\Program Files\Litecoin\src\qt\locale  
Extract: bitcoin\_af\_ZA.ts

Extract: bitcoin\_ar.ts  
Extract: bitcoin\_bg.ts  
Extract: bitcoin\_bs.ts  
Extract: bitcoin\_ca.ts  
Extract: bitcoin\_ca\_ES.ts  
Extract: bitcoin\_cs.ts  
Extract: bitcoin\_cy.ts  
Extract: bitcoin\_da.ts  
Extract: bitcoin\_de.ts  
Extract: bitcoin\_el\_GR.ts

Extract: bitcoin\_en.ts  
Extract: bitcoin\_eo.ts  
Extract: bitcoin\_es.ts  
Extract: bitcoin\_es\_CL.ts  
Extract: bitcoin\_et.ts  
Extract: bitcoin\_eu\_ES.ts  
Extract: bitcoin\_fa.ts  
Extract: bitcoin\_fa\_IR.ts  
Extract: bitcoin\_fi.ts  
Extract: bitcoin\_fr.ts

Extract: bitcoin\_fr\_CA.ts  
Extract: bitcoin\_gu\_IN.ts  
Extract: bitcoin\_he.ts  
Extract: bitcoin\_hi\_IN.ts  
Extract: bitcoin\_hr.ts  
Extract: bitcoin\_hu.ts  
Extract: bitcoin\_it.ts  
Extract: bitcoin\_ja.ts  
Extract: bitcoin\_la.ts  
Extract: bitcoin\_lt.ts

Extract: bitcoin\_lv\_LV.ts  
Extract: bitcoin\_nb.ts  
Extract: bitcoin\_nl.ts  
Extract: bitcoin\_pl.ts  
Extract: bitcoin\_pt\_BR.ts  
Extract: bitcoin\_pt\_PT.ts  
Extract: bitcoin\_ro\_RO.ts  
Extract: bitcoin\_ru.ts  
Extract: bitcoin\_sk.ts  
Extract: bitcoin\_sr.ts

Extract: bitcoin\_sv.ts  
Extract: bitcoin\_th\_TH.ts  
Extract: bitcoin\_tr.ts  
Extract: bitcoin\_uk.ts  
Extract: bitcoin\_zh\_CN.ts  
Extract: bitcoin\_zh\_TW.ts  
Output folder: C:\Program Files\Litecoin\src\qt\res  
Extract: bitcoin-qt.rc  
Output folder: C:\Program Files\Litecoin\src\qt\res\icons  
Extract: add.png

---

Extract: address-book.png  
Extract: bitcoin.icns  
Extract: bitcoin.ico  
Extract: bitcoin.png  
Extract: bitcoin\_testnet.ico  
Extract: bitcoin\_testnet.png  
Extract: clock1.png  
Extract: clock2.png  
Extract: clock3.png  
Extract: clock4.png

Extract: clock5.png  
Extract: configure.png  
Extract: connect0\_16.png  
Extract: connect1\_16.png  
Extract: connect2\_16.png  
Extract: connect3\_16.png  
Extract: connect4\_16.png  
Extract: debugwindow.png  
Extract: edit.png  
Extract: editcopy.png

Extract: editpaste.png  
Extract: export.png  
Extract: filesave.png  
Extract: history.png  
Extract: key.png  
Extract: litecoin.icns  
Extract: lock\_closed.png  
Extract: lock\_open.png  
Extract: notsynced.png  
Extract: overview.png

Extract: qrcode.png  
Extract: quit.png  
Extract: receive.png  
Extract: remove.png  
Extract: send.png  
Extract: synced.png  
Extract: toolbar.png  
Extract: toolbar\_testnet.png  
Extract: transaction0.png  
Extract: transaction2.png

Extract: tx\_inout.png  
Extract: tx\_input.png  
Extract: tx\_mined.png  
Extract: tx\_output.png  
Output folder: C:\Program Files\Litecoin\src\qt\res\images  
Extract: about.png  
Extract: splash.png  
Extract: splash\_testnet.png  
Output folder: C:\Program Files\Litecoin\src\qt\res\movies  
Extract: update\_spinner.mng

Output folder: C:\Program Files\Litecoin\src\qt\res\src  
Extract: bitcoin.svg  
Extract: clock1.svg  
Extract: clock2.svg  
Extract: clock3.svg  
Extract: clock4.svg  
Extract: clock5.svg  
Extract: clock\_green.svg  
Extract: inout.svg  
Extract: questionmark.svg

Output folder: C:\Program Files\Litecoin\src\qt\test

Extract: test\_main.cpp

Extract: uritests.cpp

Extract: uritests.h

Output folder: C:\Program Files\Litecoin\src\test

Extract: Checkpoints\_tests.cpp

Extract: DoS\_tests.cpp

Extract: README

Extract: accounting\_tests.cpp

Extract: alert\_tests.cpp

Extract: allocator\_tests.cpp

Extract: base32\_tests.cpp

Extract: base58\_tests.cpp

Extract: base64\_tests.cpp

Extract: bignum\_tests.cpp

Extract: bloom\_tests.cpp

Extract: canonical\_tests.cpp

Extract: checkblock\_tests.cpp

Extract: compress\_tests.cpp

Extract: getarg\_tests.cpp

Extract: key\_tests.cpp

Extract: miner\_tests.cpp

Extract: mruset\_tests.cpp

Extract: multisig\_tests.cpp

Extract: netbase\_tests.cpp

Extract: pmt\_tests.cpp

Extract: rpc\_tests.cpp

Extract: script\_P2SH\_tests.cpp

Extract: script\_tests.cpp

Extract: sscript\_tests.cpp

Extract: serialize\_tests.cpp

Extract: sigopcount\_tests.cpp

Extract: test\_bitcoin.cpp

Extract: transaction\_tests.cpp

Extract: uint160\_tests.cpp

Extract: uint256\_tests.cpp

Extract: util\_tests.cpp

Extract: wallet\_tests.cpp

Output folder: C:\Program Files\Litecoin\src\test\data

Extract: alertTests

Extract: base58\_encode\_decode.json  
 Extract: base58\_keys\_invalid.json  
 Extract: base58\_keys\_valid.json  
 Extract: script\_invalid.json  
 Extract: script\_valid.json  
 Extract: sig\_canonical.json  
 Extract: sig\_noncanonical.json  
 Extract: tx\_invalid.json  
 Extract: tx\_valid.json  
 Output folder: C:\Program Files\Litecoin\src

Output folder: C:\Program Files\Litecoin  
 Output folder: C:\Program Files\Litecoin  
 Created uninstaller: C:\Program Files\Litecoin\uninstall.exe  
 Create folder: C:\Users\daniel.piggott\AppData\Roaming\Microsoft\Windows\Start M.  
 Create shortcut: C:\Users\daniel.piggott\AppData\Roaming\Microsoft\Windows\Start.  
 Create shortcut: C:\Users\daniel.piggott\AppData\Roaming\Microsoft\Windows\Start.  
 Completed

### 6.1.5. Litecoin Windows Version 8.6.2 hashes

Name	Date modified	Type	Size
daemon	12/04/2014 09:03	File folder	
src	12/04/2014 09:03	File folder	
COPYING.txt	30/01/2011 00:00	Text Document	2 KB
litecoin-qt.exe	30/01/2011 00:00	Application	21,591 KB
readme.txt	30/01/2011 00:00	Text Document	2 KB
uninstall.exe	12/04/2014 09:03	Application	148 KB

MD5 hash of Litecoin-qt.exe after install

7a7a4d440e3124f2f7b6f99a998ed3bd

SHA1 hash of Litecoin-qt.exe after install

8bd61b6e27467284afd0e9712bbb013444b2b086

Daniel Piggott, Piggott.daniel@gmail.com

Users > daniel.piggott > AppData > Roaming > Litecoin

View > Explore Timeline > New folder

Name	Date modified	Type	Size
blocks	12/04/2014 09:51	File folder	
chainstate	12/04/2014 09:51	File folder	
database	12/04/2014 09:51	File folder	
.lock	12/04/2014 09:51	LOCK File	0 KB
db.log	12/04/2014 09:51	LOG File	0 KB
debug.log	12/04/2014 10:09	LOG File	32 KB
peers.dat	12/04/2014 10:06	DAT File	10 KB
wallet.dat	12/04/2014 09:51	DAT File	80 KB

MD5 hash of *wallet.dat* after install

464676815909de36e5678aa9bd229126

SHA1 hash of *wallet.dat* after install

a67b1687afac2bf050a360ab470468dff3a3ce40

MD5 hash of *peers.dat* after install

163536ff7c1fe45e41843f58a2d16b52








SHA1 hash of *peers.dat* after install

f9092ae632b9c4b53024018ad430eabe8267b08d

### 6.1.6. Litecoin Windows Version 8.6.2 hashes after uninstallation

) ▾ Users ▾ daniel.piggott ▾ AppData ▾ Roaming ▾ Litecoin ▾

with ▾ Explore Timeline New folder

Name ▲	Date modified	Type	Size
 blocks	12/04/2014 09:51	File folder	
 chainstate	12/04/2014 09:51	File folder	
 .lock	12/04/2014 09:51	LOCK File	0 KB
 db.log	12/04/2014 09:51	LOG File	0 KB
 debug.log	12/04/2014 10:16	LOG File	42 KB
 peers.dat	12/04/2014 10:16	DAT File	10 KB
 wallet.dat	12/04/2014 10:16	DAT File	80 KB

MD5 hash of *wallet.dat* after uninstall

4f8957e0405270fca06558b6959ded74

SHA1 hash of *wallet.dat* after install

88fc79c81818df06b5a7b89bd8ba5b51465e6d6d

MD5 hash of *peers.dat* after install

163536ff7c1fe45e41843f58a2d16b52

SHA1 hash of *peers.dat* after install

f9092ae632b9c4b53024018ad430eabe8267b08d

## 6.1.7. Summary of trades

User	Type	Price	Amount	Reference	Created	Status
<b>Trade History</b>						
User	Type	Price	Amount	Reference	Created	Status
<a href="#">jpsdesign (100% , 21)</a>	Buying	11.42 GBP	300.00000000 GBP	LLLLL7747	2013-12-18 09:33:29	Bought <a href="#">View</a>
<a href="#">ScottJ (100% , 148)</a>	Buying	10.08 GBP	300.00000000 GBP	LLLLL7743	2013-12-18 09:16:12	Cancelled <a href="#">View</a>
<a href="#">ScottJ (100% , 148)</a>	Buying	14.24 GBP	300.00000000 GBP	LLLLL7607	2013-12-17 13:13:22	Cancelled <a href="#">View</a>
<a href="#">Lewwardington (100% , 116)</a>	Buying	21.08 GBP	300.00000000 GBP	LLLLL6279	2013-12-06 20:30:51	Bought <a href="#">View</a>

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Latest trade: Fort Collins, CO, United States, 45 minutes ago.

## 6.1.8. Detail of first trade id 6279

### Trade Status

No action required  
Trade complete.

You bought litecoins from [Lewwardington](#).

**Information from [Lewwardington](#):**

Hello! I'm currently -ONLINE-- and able to trade. Payment is via bank transfer. Trades will be transacted very FAST-- If your a newbie to cryptocurrency or litecoin in general I'll be more than happy to help with any queries :)

**Bank Transfer Information:** Bank transfer to : Lewis Ward 09-01-28 53812802

**Payment Method:** Cash deposit

**Cash Trade Information:**

Hello! I'm currently -ONLINE-- and able to trade. Payment is via bank transfer. Trades will be transacted very FAST-- If your a newbie to cryptocurrency or litecoin in general I'll be more than happy to help with any queries :)

**Reference/message:** N/A

**Trading:** 14.22815125 LTC for 300.00 GBP (21.08 GBP / LTC)

**Trade ID:** 6279

This trade is complete. You left the feedback: very helpful, and prompt, thank you

Daniel Piggott, [Piggott.daniel@gmail.com](mailto:Piggott.daniel@gmail.com)



Refresh

5 mon ago Lewwardington says: Hello, I'm now back from my short hiatus and able to sell again :)

5 mon ago Lewwardington says: Received, thanks!

5 mon ago thestitch says: sure its p i g o t t

5 mon ago Lewwardington says: Hey, sorry for the delay; I was AFK. What's your surname? Just so I can confirm I've recieved the money/

5 mon ago thestitch says: that has helped. Payment has been sent.

5 mon ago Lewwardington says: Once the trade is funded, you send me the money via bank transfer. As soon as the money appears in my account I will release the LTC to you :)

5 mon ago Lewwardington says: That may answer some questions :)

5 mon ago Lewwardington says: <https://litecoinlocal.org/buyer-guide.php>

5 mon ago Lewwardington says: Confirming that escrow is funded :)

5 mon ago thestitch says: ok, what are the confirmations it is waiting for?

5 mon ago Lewwardington says: LTC is on its way to escrow

5 mon ago Lewwardington says: I will fund the escrow now then :)

5 mon ago thestitch says: Yes that is correct

5 mon ago Lewwardington says: You're looking for £300 worth?

5 mon ago Lewwardington says: Hey, welcome!

5 mon ago thestitch says: Newbie, first trade!

Litecoinlocal.org - Windows Internet Explorer

https://www.litecoinlocal.org/user/1025

## Viewing user profile for Lewwardington

### Info

Username	Lewwardington
Total trades	141
Positive Trades	116
Negative Trades	0
Last Active	1 day ago
Total LTC Volume	5361.52194363

This user has never been reported

[Report User](#)

### Trade Feedback for Lewwardington

Zebedee (100% , 1) **Positive:** Very easy & quick trade! 5!!!

jessiejess (100% , 3) **Positive:** Very helpful and fast response

SWOKKO (100% , 4) **Positive:** Great trade. Recommended seller. God comms.

S6RNR (100% , 2) **Positive:** Smooth transaction..

lazmo (100% , 2) **Positive:** Thank you very much very helpful

SWOKKO (100% , 4) **Positive:** Another efficient trade thanks.

Mufasa (100% , 1) **Positive:** very quick and trustworthy thank you Lewwardington

a99 (100% , 1) **Positive:** Great service, really quick, thanks again

steveleese (100% , 18) **Positive:** Great seller, thanks

SWOKKO (100% , 4) **Positive:** Once more a good trade with excellent communications - recommended.

sulaiman03 (100% , 2) **Positive:** Thanks mate, smooth transaction. A+++

SilverRelic (100% , 5) **Positive:** Super fast seller, will happily trade again!

amirtrota (100% , 0) **Positive:** send the money at 4am in the morning the Litecoins in my account . thanks

### Ads

Trader	Location	Last Online	Limits	Payment Method	Price / LTC	
Lewwardington (100% , 116)	London, United Kingdom	1 day ago	250 - 7000 GBP	Bank wire (SWIFT)	7.3 GBP	<a href="#">Buy</a>
Lewwardington (100% , 116)	London, United Kingdom	1 day ago	250 - 7000 GBP	Bank wire (SWIFT)	7.3 GBP	<a href="#">Buy</a>
Lewwardington (100% , 116)	London, United Kingdom	1 day ago	10 - 100 GBP	Bank wire (SWIFT)	8.44 GBP	<a href="#">Buy</a>

## 6.1.9. Detail of second trade id 7607 – cancelled

### Trade Status

No action required

**Trade cancelled by Admin.**

No more changes can be made to this trade.

You are buying litecoins from [ScottJ](#).

**Information from ScottJ:**

ONLINE NOW (11am to 11pm, Tuesday 17th December) UK Faster Payments Only please :)

**Bank Transfer Information:** Faster Payments transfers from UK banks only,

**Payment Method:** Cash deposit

**Cash Trade Information:**

ONLINE NOW (11am to 11pm, Tuesday 17th December) UK Faster Payments Only please :)

**Reference/message:** N/A

**Trading:** 21.06185445 LTC for 300.00 GBP (14.24 GBP / LTC)

**Trade ID:** 7607

Upload Pictures (other person can see) (max 3 images, .png, .gif, .jpeg or .jpg)

Refresh

4 mon ago thestitch says: found one, bitbargain.co.uk does litecoins. could you give me tips on how to place my balance on this site in a wallet offline? can't see an option?

4 mon ago ScottJ says: Just bitcoins

4 mon ago thestitch says: ok, does that do buy/sell litecoins as well? or just bitcoins?

4 mon ago ScottJ says: Currently I have to do it myself, which, as you've experienced, isn't a great process.

4 mon ago ScottJ says: On localbitcoins.com the site does the ID verification, which makes it a lot easier

4 mon ago ScottJ says: Yes, this is something they are working on

4 mon ago thestitch says: maybe there is an opportunity for the site to verify sellers and buyers

4 mon ago ScottJ says: I'm afraid so, sorry about that

4 mon ago ScottJ says: Escrow is only for the LTC; there is no escrow for the £.

4 mon ago thestitch says: if it is a problem for you, do we agree to cancel the trade?

4 mon ago ScottJ says: By showing me that you have the card linked to the account, I can safely presume that you own it. Otherwise people could use my service to buy litecoins from hacked bank accounts.

4 mon ago thestitch says: yes i do understand that with escrow in between. So uk to uk bank account under uk law should be sufficient.

4 mon ago ScottJ says: If you were to e-mail your card with the long number obscured, this is the exact same information I will be getting.

4 mon ago ScottJ says: account number, sort-code, name on account

4 mon ago ScottJ says: \*to me, I get the following information:

4 mon ago ScottJ says: Do you understand that by making a transfer to m

4 mon ago ScottJ says: That won't work I'm afraid.

4 mon ago thestitch says: and then telling you the name of the account it's from (surname)

4 mon ago thestitch says: i wouldn't do that in any electronic transaction especially on the net. I am making payment from a uk bank account to escrow

4 mon ago ScottJ says: Simplest way is just to take a photo of your bank card (hiding your long number for security)

4 mon ago ScottJ says: I will need some official ID, I'm afraid.

4 mon ago thestitch says: hi, on last trade i made payment to escrow then gave name of account it came from, is that ok? It's a UK bank account.

4 mon ago ScottJ says: Most people sent a photo of part of their bank statement or card, with sensitive bits hidden/blurred

4 mon ago ScottJ says: And are you able to provide some basic ID, just something that matches the name on your bank account.

4 mon ago ScottJ says: Will you be sending from a UK bank account?

4 mon ago ScottJ says: Hello

4 mon ago thestitch says: Hello, like to purchase 300gbp worth

Daniel Piggott, Piggott.daniel@gmail.com

### 6.1.10. Detail of third trade id 7743 – cancelled

No action required  
**Trade cancelled by Admin.**  
 No more changes can be made to this trade.

You are buying litecoins from [ScottJ](#).

#### Information from [ScottJ](#):

ONLINE NOW (11am to 11pm, Tuesday 17th December) UK Faster Payments Only please :)

**Bank Transfer Information:** Faster Payments transfers from UK banks only,

**Payment Method:** Cash deposit

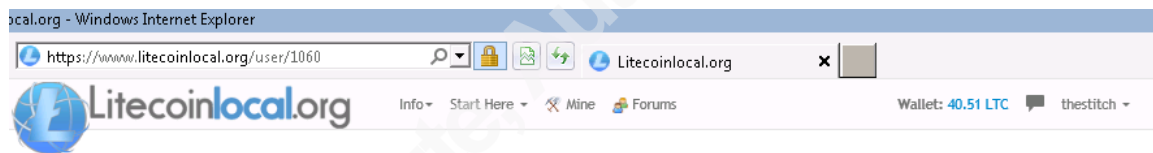
#### Cash Trade Information:

ONLINE NOW (11am to 11pm, Tuesday 17th December) UK Faster Payments Only please :)

**Reference/message:** N/A

**Trading:** 29.76565499 LTC for 300.00 GBP (10.08 GBP / LTC)

**Trade ID:** 7743



### Viewing user profile for ScottJ

#### Info

Username: ScottJ  
 Total trades: 167  
 Positive Trades: 148  
 Negative Trades: 0  
 Last Active: 2 weeks ago  
 Total LTC Volume: 8048.87068189

This user has never been reported

[Report User](#)

#### Trade Feedback for ScottJ

AT101ET (100%, 2) **Positive:**  
 AT101ET (100%, 2) **Positive:**  
 dmttc234 (100%, 3) **Positive:**  
 cjc451coins (100%, 1) **Positive:**  
 Neckss (100%, 4) **Positive:**  
 Neckss (100%, 4) **Positive:**  
 Neckss (100%, 4) **Positive:**  
 bob42jh (100%, 1) **Positive:**  
 hardgreaves (100%, 1) **Positive:**  
 albmfc (100%, 2) **Positive:** Very quick trade, extremely helpful  
 jointhonours (100%, 0) **Positive:**  
 lawsy87 (100%, 2) **Positive:**  
 phillybotbot (100%, 2) **Positive:** Great trade. Thank you very much.  
 others (100%, 0) **Positive:** Helpful seller would use again.

### 6.1.11. Detail of fourth trade id 7747 and user

Daniel Piggott, Piggott.daniel@gmail.com

# Trade Status

No action required  
**Trade complete.**

You bought litecoins from [jpsdesign](#).

**Information from [jpsdesign](#):**

Hi, I am currently online and can trade quickly! Payment is via bank transfer or Barclays Pingit....

**Bank Transfer Information:** Barclays JP Skinner 60461857 20-96-55

**Payment Method:** Bank wire (SWIFT)

**Cash Trade Information:**

Hi, I am currently online and can trade quickly! Payment is via bank transfer or Barclays Pingit....

**Reference/message:** LLLLL7747

**Trading:** 26.27791700 LTC for 300.00 GBP (11.42 GBP / LTC)

**Trade ID:** 7747

This trade is complete. You left the feedback: A+

## Chat

4 mon ago thestitch says: escrow received and payment made, thks  
4 mon ago jpsdesign says: Funds released - thanks for the trade and have a good day!  
4 mon ago jpsdesign says: All done - usually takes a few minutes for the 8 confirmations to go through...  
4 mon ago thestitch says: great, thks  
4 mon ago jpsdesign says: Hi there no problem, will fund escrow now!  
thestitch says: hello, like to buy

local.org - Windows Internet Explorer

https://www.litecoinlocal.org/user/1570

Litecoinlocal.org

Wallet: 40.51 LTC thestitch

## Viewing user profile for jpsdesign

### Info

Username	jpsdesign
Total trades	26
Positive Trades	21
Negative Trades	0
Last Active	2189 years ago
Total LTC Volume	211.18265821

This user has never been reported

Report User

### Trade Feedback for jpsdesign

- lmineLTC (100% , 107) **Positive:** Great patient buyer : )
- jondi0 (100% , 3) **Positive:** after a few teething problems which was not his fault a smooth transaction Thanks
- HHHnotch (100% , 1) **Positive:** fast and honest ty!
- HHHnotch (100% , 1) **Positive:** great, fast and secure
- litecoinninja (100% , 76) **Positive:** Excellent seller, good comms and fast release of coin A+++++
- lightcoinninja
- newagecoinlite (100% , 3) **Positive:** fast trader thanks
- Trex007 (100% , 1) **Positive:** Very professional. Great seller!
- cronchong (100% , 3) **Positive:** Quick release of funds, A+++ seller
- dpmcalli (100% , 5) **Positive:** Thanks for a great first experience buying litecoins!
- hshunter (100% , 2) **Positive:** this was my first transfer, this guy was very helpfull and was quick replying to messages.
- thestitch (100% , 1) **Positive:** A+
- gavay (100% , 4) **Positive:** BRILLIANT SELLER!!!! 10000% RECOMMENDED.

## 6.1.12. Detail of authors user id and trades

local.org - Windows Internet Explorer

https://www.litecoinlocal.org/user/5404

Litecoinlocal.org

Wallet: 40.51 LTC thestitch

## Viewing user profile for thestitch

### Info

Username	thestitch
Total trades	2
Positive Trades	1
Negative Trades	0
Last Active	1 second ago
Total LTC Volume	40.50606825

This user has never been reported

Report User

### Trade Feedback for thestitch

- jpsdesign (100% , 21) **Positive:** Very prompt payment, a pleasure to deal with, great buyer!

### 6.1.13. Email trail of trades from litecoinlocal.org

You have started a trade with Lewwardington



noreply@litecoinlocal.org (noreply@litecoinlocal.org) [Add to contacts](#) 06/12/2013  
To: dtm\_p@hotmail.co.uk ↗

From: **noreply@litecoinlocal.org**  
Sent: 06 December 2013 20:30:52  
To: [REDACTED]

I trust noreply@litecoinlocal.org. Always show content.

Hello,

You have initiated a trade with Lewwardington. View trade progress or message the seller at <https://LitecoinLocal.org>.

Sincerely,

The LitecoinLocal Team

Daniel Piggott, Piggott.daniel@gmail.com

## New message from Lewwardington about your trade



noreply@litecoinlocal.org (noreply@litecoinlocal.org) [Add to contacts](#) 09/12/2013 ▶  
To: dtm\_p@hotmail.co.uk ↗

From: **noreply@litecoinlocal.org** You moved this message to its current location.  
Sent: 09 December 2013 15:46:49  
To: ██████████

Hello,

You received a new message from Lewwardington about your trade.  
Visit <https://litecoinlocal.org/viewtrade.php?id=6279> to view it.

Sincerely,

The LitecoinLocal Team

## You have started a trade with ScottJ



noreply@litecoinlocal.org [Add to contacts](#) 17/12/2013 ▶  
To: dtm\_p@hotmail.co.uk ↗

From: **noreply@litecoinlocal.org**  
Sent: 17 December 2013 13:13:23  
To: ██████████

Hello,

You have initiated a trade with ScottJ. View trade progress or  
message the seller at <https://LitecoinLocal.org>.

Sincerely,

The LitecoinLocal Team

Daniel Piggott, Piggott.daniel@gmail.com

## New message from ScottJ about your trade



noreply@litecoinlocal.org [Add to contacts](#) 17/12/2013 |▶  
To: dtm\_p@hotmail.co.uk ✉

From: **noreply@litecoinlocal.org**  
Sent: 17 December 2013 13:15:20  
To: [REDACTED]

Hello,

You received a new message from ScottJ about your trade. Visit <https://litecoinlocal.org/viewtrade.php?id=7607> to view it.

Sincerely,

The LitecoinLocal Team

Same message 17/12/13 13:15:32

Same message 17/12/13 13:15:38

Same message 17/12/13 13:15:44

Same message 17/12/13 14:17:57

Same message 17/12/13 14:18:53

Same message 17/12/13 14:22:54

Same message 17/12/13 14:23:26

Same message 17/12/13 14:24:02

Same message 17/12/13 14:24:15

Same message 17/12/13 14:24:25

Same message 17/12/13 14:25:39

Same message 17/12/13 14:26:23

Same message 17/12/13 14:26:38

Daniel Piggott, Piggott.daniel@gmail.com



Your trade with ScottJ is canceled



noreply@litecoinlocal.org [Add to contacts](#) 17/12/2013 ▶  
To: dtm\_p@hotmail.co.uk ✉

From: **noreply@litecoinlocal.org**  
Sent: 17 December 2013 14:29:26  
To: [REDACTED]

Hello,

Your trade with ScottJ is now cancelled.

Sincerely,

The LitecoinLocal Team

New message from ScottJ about your trade



noreply@litecoinlocal.org [Add to contacts](#) 17/12/2013 ▶  
To: dtm\_p@hotmail.co.uk ✉

From: **noreply@litecoinlocal.org**  
Sent: 17 December 2013 14:32:07  
To: [REDACTED]

Hello,

You received a new message from ScottJ about your trade. Visit <https://litecoinlocal.org/viewtrade.php?id=7607> to view it.

Sincerely,

The LitecoinLocal Team

Same message 17/12/13 14:33:06

Same message 17/12/13 14:33:52

Daniel Piggott, Piggott.daniel@gmail.com

Same message 17/12/13 14:37:36

Same message 18/12/13 09:16:14

Your trade with ScottJ is canceled



noreply@litecoinlocal.org [Add to contacts](#) 18/12/2013 ▶  
To: dtm\_p@hotmail.co.uk ✉

From: **noreply@litecoinlocal.org**  
Sent: 18 December 2013 09:21:42  
To: [REDACTED]

Hello,

Your trade with ScottJ is now cancelled.

Sincerely,

The LitecoinLocal Team

Daniel Piggott, Piggott.daniel@gmail.com

You have started a trade with jpsdesign

↑ ↓ ×



noreply@litecoinlocal.org [Add to contacts](#) 18/12/2013 ▶  
To: dtm\_p@hotmail.co.uk ↗

From: **noreply@litecoinlocal.org**  
Sent: 18 December 2013 09:33:31  
To: [REDACTED]

Hello,

You have initiated a trade with jpsdesign. View trade progress or message the seller at <https://LitecoinLocal.org>.

Sincerely,

The LitecoinLocal Team

New message from jpsdesign about your trade

↑ ↓ ×



noreply@litecoinlocal.org [Add to contacts](#) 18/12/2013 ▶  
To: dtm\_p@hotmail.co.uk ↗

From: **noreply@litecoinlocal.org**  
Sent: 18 December 2013 09:34:44  
To: [REDACTED]

Hello,

You received a new message from jpsdesign about your trade. Visit <https://litecoinlocal.org/viewtrade.php?id=7747> to view it.

Sincerely,

The LitecoinLocal Team

Same message 18/12/13 09:41:37

Daniel Piggott, Piggott.daniel@gmail.com

## Escrow for your trade with jpsdesign is funded



noreply@litecoinlocal.org [Add to contacts](#) 18/12/2013 ▶

To: dtm\_p@hotmail.co.uk ↗

From: **noreply@litecoinlocal.org**

Sent: 18 December 2013 10:06:04

To: [REDACTED]

Hello,

Your trade with jpsdesign is fully funded.

Sincerely,

The LitecoinLocal Team

## Your trade with jpsdesign is complete



noreply@litecoinlocal.org [Add to contacts](#) 18/12/2013 ▶

To: dtm\_p@hotmail.co.uk ↗

From: **noreply@litecoinlocal.org**

Sent: 18 December 2013 10:13:31

To: [REDACTED]

Hello,

Your trade with jpsdesign is now complete. Please remember to leave feedback at <https://litecoinlocal.org/viewtrade.php?id=7747>.

Sincerely,

The LitecoinLocal Team

Daniel Piggott, Piggott.daniel@gmail.com

New message from jpsdesign about your trade

↑ ↓ ×



noreply@litecoinlocal.org [Add to contacts](#) 18/12/2013 ▶  
To: dtm\_p@hotmail.co.uk ✉

From: **noreply@litecoinlocal.org**  
Sent: 18 December 2013 10:13:52  
To: [REDACTED]

Hello,

You received a new message from jpsdesign about your trade. Visit <https://litecoinlocal.org/viewtrade.php?id=7747> to view it.

Sincerely,

The LitecoinLocal Team

#### 6.1.14. Forensic Tool Log for Scenario 1 laptop

IEF Triage 6.3.0.0021

Copyright 2009-2014 Magnet Forensics® Inc.

Build 6.3.0.0021

Case Information Generated At: 03/16/2014 10:56:33

Operating System: Microsoft Windows NT 6.2.9200.0

Selected source:

-----

PhysicalDrive0 - Partition 1 (Microsoft NTFS, 450 MB) System

Searches selected:

-----

pagefile.sys

swapfile.sys

Daniel Piggott, Piggott.daniel@gmail.com

\$MFT  
\$LogFile  
hiberfil.sys  
Volume Shadow Copies  
Unallocated Clusters  
File Slack Space  
All Files and Folder  
Uninitialized File Area

Selected source:

-----

PhysicalDrive0 - Partition 2 (Microsoft FAT32, 260 MB) NO NAME

Searches selected:

-----

Unallocated Clusters  
File Slack Space  
All Files and Folder

Selected source:

-----

PhysicalDrive0 - Partition 3 (Microsoft NTFS, 128 MB)

Searches selected:

-----

pagefile.sys  
swapfile.sys  
\$MFT  
\$LogFile  
hiberfil.sys  
Volume Shadow Copies  
Unallocated Clusters  
File Slack Space

All Files and Folder  
Uninitialized File Area

Selected source:

-----

PhysicalDrive0 - Partition 4 (Microsoft NTFS, 100.38 GB) TI31036500A [C:\]

Searches selected:

-----

pagefile.sys  
swapfile.sys  
\$MFT  
\$LogFile  
hiberfil.sys  
Volume Shadow Copies  
Unallocated Clusters  
File Slack Space  
All Files and Folder  
Uninitialized File Area

Selected source:

-----

PhysicalDrive0 - Partition 5 (Microsoft NTFS, 350 MB)

Searches selected:

-----

pagefile.sys  
swapfile.sys  
\$MFT  
\$LogFile  
hiberfil.sys  
Volume Shadow Copies  
Unallocated Clusters

File Slack Space  
All Files and Folder  
Uninitialized File Area

Selected source:

-----

PhysicalDrive0 - Partition 6 (Microsoft NTFS, 9.71 GB) Recovery

Searches selected:

-----

pagefile.sys  
swapfile.sys  
\$MFT  
\$LogFile  
hiberfil.sys  
Volume Shadow Copies  
Unallocated Clusters  
File Slack Space  
All Files and Folder  
Uninitialized File Area

Selected source:

-----

PhysicalDrive0 - Partition 7 (8 GB)

Searches selected:

-----

Sector Level

Selected source:

-----

PhysicalDrive0 - Unpartitioned Space



Searches selected:

-----

Unpartitioned Space

Search items selected:

-----

Platform: Computer

-----

AIM

Adium

Ares

BeBo

Bing Bar

Bitcoin

Browser Activity

Carbonite

Chatroulette

Chrome

Dropbox

Emule

Facebook Chat

Facebook Email

Facebook Email 'Snippets'

Facebook Pictures

Facebook Status Updates / Wall Posts / Comments

Facebook Web Page Fragments

Firefox

Flash Cookies

Flash Video Fragments

Flickr

Frostwire.props Files

Gigatribe

Gmail

Daniel Piggott, Piggott.daniel@gmail.com

Google Bar  
Google Maps  
Google Plus  
Google Talk  
GoogleDocs  
GoogleDrive  
Hotmail  
Hushmail  
ICQ  
IRC  
Instagram  
Internet Explorer 10-11 History  
Internet Explorer v5-9  
Internet Explorer v7-v10 InPrivate/Recovery URLs  
LINE Pictures  
Limerunner  
Limewire searches (v5.2.8 - v5.5.16)  
Limewire shared Files  
Limewire.props Files  
Limewire®/Frostwire® 4.x.x Searches  
LinkedIn  
Luckywire  
Mail.ru Chat  
Mailinator  
Messenger Plus  
MySpace  
Omegle  
Oovoo  
Opera  
Outlook Webmail  
Pal Talk  
Pictures  
Pidgin

Daniel Piggott, Piggott.daniel@gmail.com

QQ Chat  
RebuildWeb  
Safari  
SafeBrowser  
Second Life  
Shareaza  
Sina Weibo  
SkyDrive  
Skype  
TorChat  
Torrent  
Trillian  
Twitter  
Usenet  
Videos  
WeChat  
Webpage Recovery  
Windows Live Messenger  
WoW  
XBox Internet Explorer History  
Yahoo Mail  
Yahoo! Messenger - Non-encrypted Chat  
Yahoo! Messenger Chat  
Yahoo! Messenger Diagnostic Logs  
Yahoo! Messenger Group Chat  
Yahoo! Webmail Chat  
iChat  
iMessage  
iOS Backups

-----

Output folder: D:\IEF - Mar 16 2014 105609\

Daniel Piggott, Piggott.daniel@gmail.com

-----  
-----  
Start time: Mar 16, 2014 10:56:33  
-----

-----  
End time: Mar 16, 2014 14:38:54  
-----

-----  
Duration: 03:42:21  
-----

Final results of search:  
-----

Pictures: 60690 items

Pictures\_DATA: 60690 items

Browser Activity: 7505 items

Flash Cookies: 6 items

Carved Video: 311 items

Carved Video\_DATA: 311 items

Cloud Services URLs: 6 items

Social Media URLs: 5 items

Videos: 802 items

Facebook URLs: 12 items

Parsed Search Queries: 10 items

Malware/Phishing URLs: 31 items

Safari Bookmarks: 2 items

Pornography URLs: 2 items

QQ: 2 items

Internet Explorer 10-11 Content: 104 items

Internet Explorer 10-11 Main History: 50 items

Daniel Piggott, Piggott.daniel@gmail.com

Internet Explorer 10-11 Daily/Weekly History: 29 items

Facebook Chat: 103 items

Firefox Downloads: 2 items

Firefox Bookmarks: 9 items

Firefox FavIcons: 2 items

Firefox Web History: 2 items

IE InPrivate/Recovery URLs: 73 items

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### 6.1.15. Forensic Tool Log for Scenario 2 laptop

IEF Triage 6.3.2.0005

Copyright 2009-2014 Magnet Forensics® Inc.

Build 6.3.2.0005

Case Information Generated At: 03/23/2014 12:14:06

Operating System: Microsoft Windows NT 6.1.7601 Service Pack 1

Selected source:

-----

PhysicalDrive0 - Partition 1 (Microsoft NTFS, 100 MB) System Reserved

Searches selected:

-----

pagefile.sys

swapfile.sys

\$MFT

\$LogFile

hiberfil.sys

Volume Shadow Copies

Unallocated Clusters

File Slack Space

All Files and Folder

Uninitialized File Area

Selected source:

-----

PhysicalDrive0 - Partition 2 (Microsoft NTFS, 297.99 GB) [C:]

Searches selected:

-----

pagefile.sys

Daniel Piggott, Piggott.daniel@gmail.com

swapfile.sys

\$MFT

\$LogFile

hiberfil.sys

Volume Shadow Copies

Unallocated Clusters

File Slack Space

All Files and Folder

Uninitialized File Area

Selected source:

-----

PhysicalDrive0 - Unpartitioned Space

Searches selected:

-----

Unpartitioned Space

Search items selected:

-----

Platform: Computer

-----

Adium

AIM

Ares

BeBo

Bing Bar

Bitcoin

Browser Activity

Carbonite

Chatroulette

Chrome

Dropbox

Emule  
Facebook Chat  
Facebook Email  
Facebook Email 'Snippets'  
Facebook Pictures  
Facebook Status Updates / Wall Posts / Comments  
Facebook Web Page Fragments  
Firefox  
Flash Cookies  
Flash Video Fragments  
Flickr  
Frostwire.props Files  
Gigatribe  
Gmail  
Google Bar  
Google Maps  
Google Plus  
Google Talk  
GoogleDocs  
GoogleDrive  
Hotmail  
Hushmail  
iChat  
ICQ  
iMessage  
Instagram  
Internet Explorer 10-11 HisTory  
Internet Explorer v5-9  
Internet Explorer v7-v10 InPrivate/Recovery URLs  
iOS Backups  
IRC  
Limerunner  
Limewire searches (v5.2.8 - v5.5.16)

Daniel Piggott, Piggott.daniel@gmail.com



Limewire shared Files  
Limewire.props Files  
Limewire®/Frostwire® 4.x.x Searches  
LINE Pictures  
LinkedIn  
Luckywire  
Mail.ru Chat  
Mailinator  
Malware/Phishing sites  
Messenger Plus  
MySpace  
Omegle  
Oovoo  
Opera  
Outlook Webmail  
Pal Talk  
Pictures  
Pidgin  
Pornography sites  
QQ Chat  
RebuildWeb  
Safari  
SafeBrowser  
Second Life  
Shareaza  
Sina Weibo  
SkyDrive  
Skype  
TorChat  
Torrent  
Trillian  
Twitter  
Usenet

Daniel Piggott, Piggott.daniel@gmail.com

Videos  
Webpage Recovery  
WeChat  
Windows Live Messenger  
WoW  
XBox Internet Explorer HisTory  
Yahoo Mail  
Yahoo! Messenger - Non-encrypted Chat  
Yahoo! Messenger Chat  
Yahoo! Messenger Diagnostic Logs  
Yahoo! Messenger Group Chat  
Yahoo! Webmail Chat

-----  
Output folder: E:\IEF - Mar 23 2014 121338\  
-----

-----  
Start time: Mar 23, 2014 12:14:06  
-----

-----  
End time: Mar 24, 2014 23:14:46  
-----

-----  
Duration: 1 days 11:00:40  
-----

Final results of search:  
-----

Browser Activity: 14517 items

Daniel Piggott, Piggott.daniel@gmail.com

Pictures: 52174 items  
Pictures\_DATA: 52174 items  
Cloud Services URLs: 5 items  
Malware/Phishing URLs: 25 items  
Internet Explorer 10-11 Content: 12678 items  
Ares Search Keywords: 10 items  
Internet Explorer 10-11 Main History: 2217 items  
Parsed Search Queries: 1371 items  
Facebook URLs: 632 items  
Skype IP Addresses: 17 items  
Internet Explorer 10-11 Daily/Weekly History: 504 items  
IE InPrivate/Recovery URLs: 1245 items  
Social Media URLs: 879 items  
Skype Calls Carved: 4 items  
Skype Chat Messages: 67 items  
Classifieds URLs: 1042 items  
Facebook Pages: 22 items  
Google Maps: 1 items  
Carved Video: 788 items  
Carved Video\_DATA: 788 items  
Internet Explorer Typed URLs: 7 items  
Videos: 164 items  
Bitcoin Addresses: 1 items  
Internet Explorer Cache Records Carved: 2337 items  
Internet Explorer Redirect Records: 36 items  
Internet Explorer PrivacIE Records: 473 items  
Internet Explorer Leak Records: 6 items  
Torrent URLs: 4 items  
Internet Explorer Main History: 177 items  
Internet Explorer Daily History: 66 items  
Internet Explorer Cookie Records: 75 items  
Skype Calls - djpiggott: 1 items  
Skype Accounts - djpiggott: 1 items

Daniel Piggott, Piggott.daniel@gmail.com

Skype Group Chat - djpiggott: 2 items  
Skype Contacts - djpiggott: 17 items  
Internet Explorer Cookies: 152 items  
Internet Explorer 10-11 Downloads: 5 items  
Internet Explorer Cache Records: 20 items  
Rebuilt Webpages: 1 items  
Skype Chatsync Messages: 1 items  
Internet Explorer 10-11 Cookies: 62 items  
Skype Chatsync Messages Carved: 4 items

### 6.1.16. Forensic Tool Log for Scenario 3 laptop

IEF Standard 6.3.2.0002

Copyright 2009-2014 Magnet Forensics® Inc.

Build 6.3.2.0002

Case Information Generated At: 04/04/2014 14:27:24

Operating System: Microsoft Windows NT 6.1.7601 Service Pack 1

Selected source:

-----

PhysicalDrive0 - Partition 1 (Microsoft NTFS, 141.55 GB) TI102717P0A [C:]

Searches selected:

-----

pagefile.sys

swapfile.sys

\$MFT

\$LogFile

hiberfil.sys

Volume Shadow Copies

Unallocated Clusters

File Slack Space

All Files and Folder

Uninitialized File Area

Selected source:

-----

PhysicalDrive0 - Unpartitioned Space

Searches selected:

-----

Unpartitioned Space

Daniel Piggott, Piggott.daniel@gmail.com

Search items selected:

-----

Platform: Computer

-----

Adium

AIM

Ares

BeBo

Bing Bar

Bitcoin

Browser Activity

Carbonite

Chatroulette

Chrome

Dropbox

Emule

Facebook Chat

Facebook Email

Facebook Email 'Snippets'

Facebook Pictures

Facebook Status Updates / Wall Posts / Comments

Facebook Web Page Fragments

Firefox

Flash Cookies

Flash Video Fragments

Flickr

Frostwire.props Files

Gigatribe

Gmail

Google Bar

Google Maps

Google Plus

Daniel Piggott, Piggott.daniel@gmail.com

Google Talk  
GoogleDocs  
GoogleDrive  
Hotmail  
Hushmail  
iChat  
ICQ  
iMessage  
Instagram  
Internet Explorer 10-11 History  
Internet Explorer v5-9  
Internet Explorer v7-v10 InPrivate/Recovery URLs  
IRC  
Limerunner  
Limewire searches (v5.2.8 - v5.5.16)  
Limewire shared Files  
Limewire.props Files  
Limewire®/Frostwire® 4.x.x Searches  
LINE Pictures  
LinkedIn  
Luckywire  
Mail.ru Chat  
Mailinator  
Malware/Phishing sites  
Messenger Plus  
MySpace  
Omegle  
Oovoo  
Opera  
Outlook Webmail  
Pal Talk  
Pictures  
Pidgin

Daniel Piggott, Piggott.daniel@gmail.com

Pornography sites  
QQ Chat  
RebuildWeb  
Safari  
SafeBrowser  
Second Life  
Shareaza  
Sina Weibo  
SkyDrive  
Skype  
TorChat  
Torrent  
Trillian  
Twitter  
Usenet  
Videos  
Webpage Recovery  
WeChat  
Windows Live Messenger  
WoW  
XBox Internet Explorer History  
Yahoo Mail  
Yahoo! Messenger - Non-encrypted Chat  
Yahoo! Messenger Chat  
Yahoo! Messenger Diagnostic Logs  
Yahoo! Messenger Group Chat  
Yahoo! Webmail Chat

-----  
Output folder: G:\IEF - Apr 04 2014 142657\  
-----



-----  
Start time: Apr 04, 2014 14:27:22  
-----

-----  
End time: Apr 07, 2014 11:57:55  
-----

-----  
Duration: 2 days 21:30:33  
-----

Final results of search:  
-----

Browser Activity: 41318 items

Pictures: 198286 items

Pictures\_DATA: 198286 items

Parsed Search Queries: 19733 items

Malware/Phishing URLs: 21 items

Flash Cookies: 549 items

Gmail Fragments: 104 items

Limewire.props Files: 29 items

Hotmail Webmail: 268 items

AIM: 71 items

Safari History Carved: 3 items

Facebook Chat: 94 items

Facebook URLs: 2604 items

Google Maps Tiles: 409 items

Carved Video: 2329 items

Carved Video\_DATA: 2329 items

Videos: 311 items

Internet Explorer PrivacIE Records: 878 items

Social Media URLs: 12314 items

Firefox Web History: 7137 items

Firefox FormHistory: 546 items

Daniel Piggott, Piggott.daniel@gmail.com

Firefox SessionStore Artifacts: 1023 items  
Classifieds URLs: 2583 items  
Google Maps: 345 items  
Ares Search Keywords: 113 items  
Internet Explorer Cookie Records: 137 items  
Facebook Pictures: 6 items  
Facebook Pictures\_DATA: 0 items  
Web Video Fragments: 7 items  
Web Video Fragments\_DATA: 7 items  
Skype Calls Carved: 14 items  
Internet Explorer Typed URLs: 11 items  
Opera Web History: 4 items  
Facebook Pages: 128 items  
Bebo: 39 items  
Yahoo! Webmail: 23 items  
Internet Explorer Cookies: 284 items  
Chrome/360 Safe Browser Carved Web HisTory: 9768 items  
IE InPrivate/Recovery URLs: 2269 items  
Bitcoin Addresses: 1 items  
Skype IP Addresses: 49 items  
Firefox Cookies: 4124 items  
Firefox Input History: 58 items  
Firefox Downloads: 20 items  
Firefox Bookmarks: 190 items  
Firefox FavIcons: 662 items  
Torrent URLs: 68 items  
SkyDrive: 5 items  
Google Drive Desktop App: 18 items  
Safari Bookmarks: 52 items  
Skype Chat Messages: 191 items  
Skype Voicemails - djpiggott: 1 items  
Skype Calls - djpiggott: 26 items  
Skype Accounts - djpiggott: 1 items

Daniel Piggott, Piggott.daniel@gmail.com

Skype Group Chat - djpiggott: 7 items  
Skype Contacts - djpiggott: 16 items  
Google Toolbar: 30 items  
Internet Explorer Main History: 173 items  
Internet Explorer Cache Records: 3679 items  
Rebuilt Webpages: 844 items  
Internet Explorer Cache Records Carved: 3801 items  
Google Maps Queries: 62 items  
Internet Explorer Leak Records: 6 items  
Internet Explorer Redirect Records: 87 items  
Facebook Status Updates/Wall Posts/Comments: 44 items  
Internet Explorer 10-11 Main History: 13902 items  
Internet Explorer 10-11 Daily/Weekly History: 6549 items  
Internet Explorer 10-11 Content: 51567 items  
Internet Explorer 10-11 Downloads: 1 items  
Internet Explorer 10-11 Cookies: 8 items  
Cloud Services URLs: 64 items  
Dating Sites URLs: 14 items  
Internet Explorer Weekly History: 37 items  
Internet Explorer Daily History: 83 items  
Chrome Cookies: 1307 items  
Chrome Bookmarks: 2 items  
Chrome Current Session: 2 items  
Chrome Current Tabs: 1 items  
Chrome FavIcons: 1140 items  
Chrome Web History: 1427 items  
Chrome Last Session: 22 items  
Chrome Last Tabs: 17 items  
Chrome Logins: 7 items  
Chrome Keyword Search Terms: 180 items  
Chrome Downloads: 22 items  
Chrome Top Sites: 20 items  
Chrome Autofill: 548 items

Daniel Piggott, Piggott.daniel@gmail.com

Google Drive: 1 items

Skype Chatsync Messages: 5 items

Chrome Cache Records: 7995 items

Firefox Cache Records: 9123 items

Twitter: 20 items

LinkedIn Emails: 7 items

MSN Plus!: 7 items

Opera Search Field History: 1 items

Chrome/360 Safe Browser Carved Session/Tabs: 18 items

Chatroulette: 2 items

Google+ Chat: 2 items

Skype Chatsync Messages Carved: 3 items