

## **RINGKASAN BUKTI KORESPONDENSI**

Judul Artikel : Acquisition of Email Service Based Android Using NIST  
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Jurnal : (KINETIK) Game Technology, Information System, Computer Network,  
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2. Lampiran 2 : Tanggal 21 April 2018, penulis mendapatkan pemberitahuan bahwa penulis diminta untuk merevisi artikel (*revisions required*)
3. Lampiran 3 : Tanggal 21 April 2018, penulis mengirimkan hasil revisi yang diminta oleh reviewer
4. Lampiran 4 : Tanggal 21 April 2018, penulis mendapatkan notifikasi bahwa artikel diterima (*accept submission*)
5. Lampiran 5 : Tanggal 12 November 2020 artikel dinyatakan terbit (*published*)

# 1. Lampiran 1

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## Acquisition of Email Service Based Android Using NIST

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### Abstract

Email is one of the results of the development of information and communication technology. Email is widely used to exchange information by sending and receiving data, such as document files, images, correspondence and others. With the development of technology and information causing crimes in communicating also growing, the perpetrators of cybercrime commonly referred to as cybercrime. Any crime on email made by cyber crime will surely leave evidence, such as IP Address and others. Evidence of the crime can be used in the trial, so it is necessary forensic on the email. The research will do forensics on emails by way of android-based email acquisition using the method used in this study is a forensic method based on upon the available guidelines prepared by the National Institute of Standards and Technology (NIST). The acquisition process on email using smartphone android xiami with android version lollipop, from a series of research using forensic methods NIST got an IP address in the email header. IP addresses that have been found can be used digital evidence.

**Keywords:** Email, Evidence, Forensics, IP Address, NIST

### 1. Introduction

In recent decades, mobile phone users in Indonesia have been increased from 265 people with 50% penetration is internet users from 50% of internet users that 45% access various sources using mobile [1]. Among the most popular digital services in Indonesia are Gmail, Yahoo Mail and Whatsapp. The growth and development of information and communication technology has led us to exchange information via email and with the help of a web browser inside android. Inside the smartphone android can also be installed web browser like google chrome, mozilla Firefox, opera, and others. There are 5 emails frequently used by Indonesian people, like Figure 1 [2].

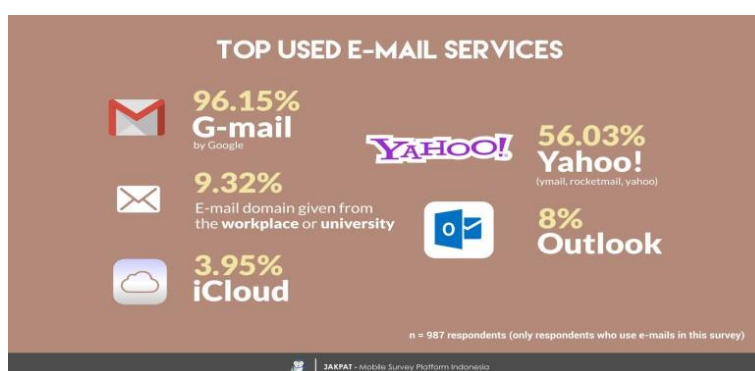


Figure 1. Top Email Used by Indonesian.

There are some emails that are often used by Indonesian people, like Gmail 96.15%, 56.03% yahoo, workplace or university 9:32%, outlook 8% and iCloud 3.95% [2]. As for the reason they use the browser for various reasons such as a faster loading process, easy user interface, safe from viruses, offers many functional features and offers themes for choice [2]. With the increasing number of users cannot be denied anymore if there are impacts in both the positive

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Paper submitted on February 26, 2016; Revision on May 1, 2016; Received on June 1, 2016

and negative impacts. The positive impact is to help complete the activity quickly, and can help a difficult job. Since the negative impact is the abuse of the technology itself is done by people who are not responsible. Email also has a weakness so it can be attacked, one of the crimes in the email there is the theft of username and password [3],[4],[5]. Crime in cyberspace called cybercrime. Cybercrime is a type of crime associated with utilizing information and communication technologies to gain unauthorized and unlimited access rights, and has a strong characteristic with a technological engineering that relies on a high level of security, from information conveyed and accessed by Internet users [6].

In the crime of cybercrime will leave the evidence, the evidence can be both digital and electronic evidence [7]. Digital evidence can be seen when criminal proceedings take place or when digital evidence has been stored, digital evidence can be handled exclusively by digital forensic science using tools to solve and draw conclusions from criminal cases on digital evidence obtained. In the email is genuine or fake can be detected using a couple of ways to view headers email [8], digital signatures, and read the log [9],[10],[11]. The handling of crime involving computer technology is still very common for now. Digital forensics is the use of science and methods for discovering, collecting, securing, analyzing, interpreting and presenting digital evidence relating to cases occurring for reconstruction purposes and the validity of the judicial process [12].

The law on cybercrime crimes is set by the laws of ITE [13]. For the crimes of ITE can be criminalized by law or civil just according to the level of crime committed. To arrest the Cybercrime authorities can raise the evil evidence stored in the smartphone as a proof of space. There is no escape from the criminal case of evidence of evidence. Almost all proving criminal cases, always rely on the examination of evidence. At least in addition to proof with other evidences, there is always a need for verification with at least two evidences [13].

In [14], the study compared the security of Google Chrome browser, Mozilla Firefox, and Microsoft Internet Explorer Edge. The methodology used is The U.S. National Institute of Justice (NIJ). The results obtained are Microsoft Edge is the default browser on Windows 10 with a better feature of Internet Explorer, but it turns out for the security aspect is weaker compared to Mozilla Firefox browser, while Google Chrome is stronger in the password.

In [4], live forensics analysis for email security comparison on the proprietary operating system forensics live analysis in the latest operating system is windows 10. This research focuses on the security of any email such as gmail, yahoo and outlook and some browsers in general, such as google chrome, mozilla Firefox, and Microsoft edge.

In [7], the study identifies the Digital Evidence On Blackberry Messenger-based instant messaging android. The results are presented in the form of recording conversations, BBM Personal Identification Number (BBM PIN), the name of the sender and receiver, and the timing of the research timestamp using the National Institute of Standards and Technology (NIST) method.

From the background above, this research will do forensic on email by way of acquisition of android based email to get IP address of sender. The sender's IP address is used as digital evidence. This study uses forensic methods based on guidelines prepared by the National Institute of Standards and Technology (NIST).

## 2. Research Method

the previous research about email, the study conducted a forensic investigation on email spoofing by examining and comparing the values contained in some email headers defined as email spoofing detection parameters. The parameters used in this study are the headers 'From', 'Message-ID', 'Date' and 'Received'. This research uses header analysis method.

In this research using National Institute of Standards and Technology (NIST) method is one method to analyze digital evidence or to obtain information from digital evidence. Here are the steps of the NIST method[15].

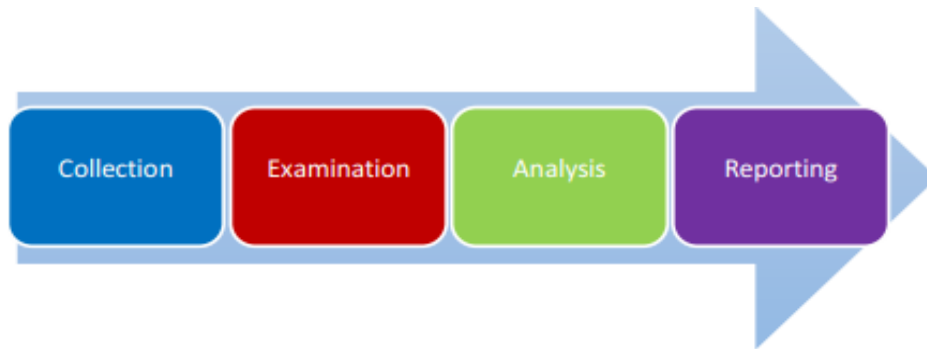


Figure 2. Stage method of the National Institute of Standards and Technology

The following explanation in Figure 2:

- Collection is identify, label, record and retrieve data from relevant data sources, then follow data integrity preservation procedures.
- Examination is the data has been collected forensic using combinations of scenarios, both manually and automatically, assess and release of data in accordance with the data requirements and maintaining the authenticity of data.
- Analysis is Perform analysis of the results of investigations by using the correct method both technically and legally to get useful information and answers questions that encourage the collection and examination.
- Reporting is Report the results of an analysis that includes a description of the action taken, specifies the tool used and the procedure selected, and the required action, then reports the results obtained.

### 3. Results and Discussion

The results of this study conducted the appointment of emails that have been sent by someone to us and then the email is forensic, forensic email is an email from google is google mail or often called Gmail. Here is the process of acquiring on android based emails using the NIST method:

#### 3.1. Collection

At this stage that is collecting goods on smartphone owners, the smartphone used in Xiaomi Mi4i with android version lollipop 5.0.2. In Figure 3 is a conceptual stage in the collection process.

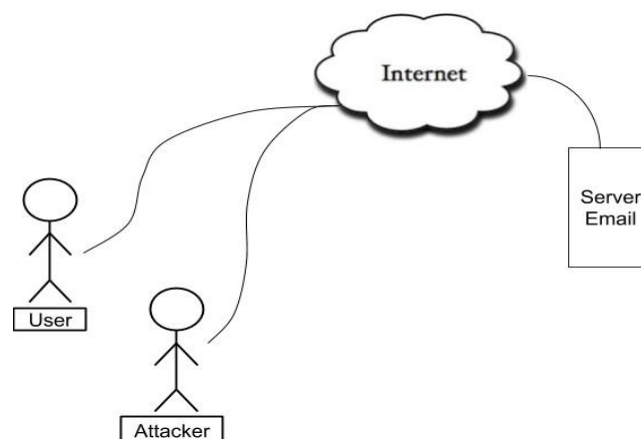


Figure 3. Conceptual Stages of collection

#### 3.2. Examination

At this stage, how to get digital evidence in email. This study uses the original browser from android system with version 9.4.10. Here is the stage of appointment of digital evidence.

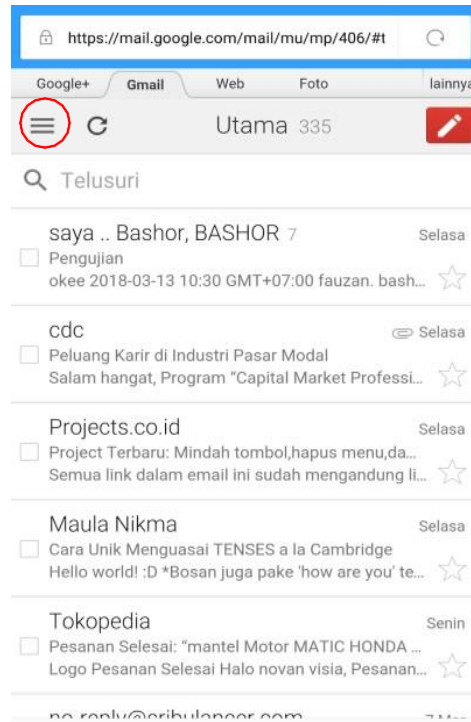


Figure 4. Initial View of Email

In Figure 4 the initial display when opening the email through the android browser. the acquisition process in the email then must be changed in the desktop display and to change the display to the desktop open the settings menu, see red circle.

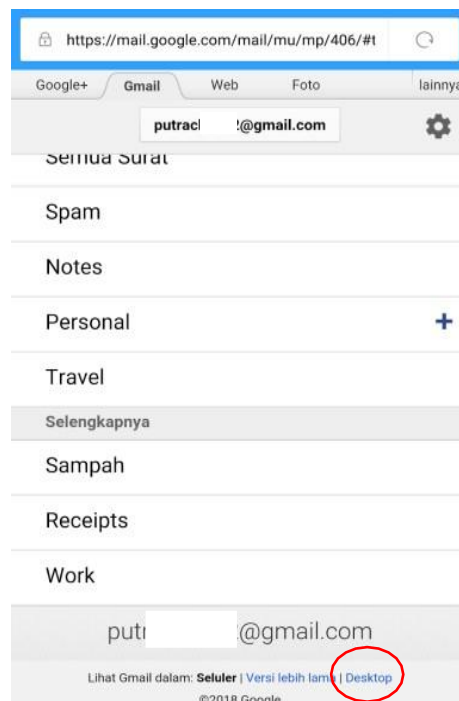


Figure 5. Changing the Display to Desktop

In Figure 5 is a display setting on Gmail opened using android browser and then click on the desktop, see the red circle.

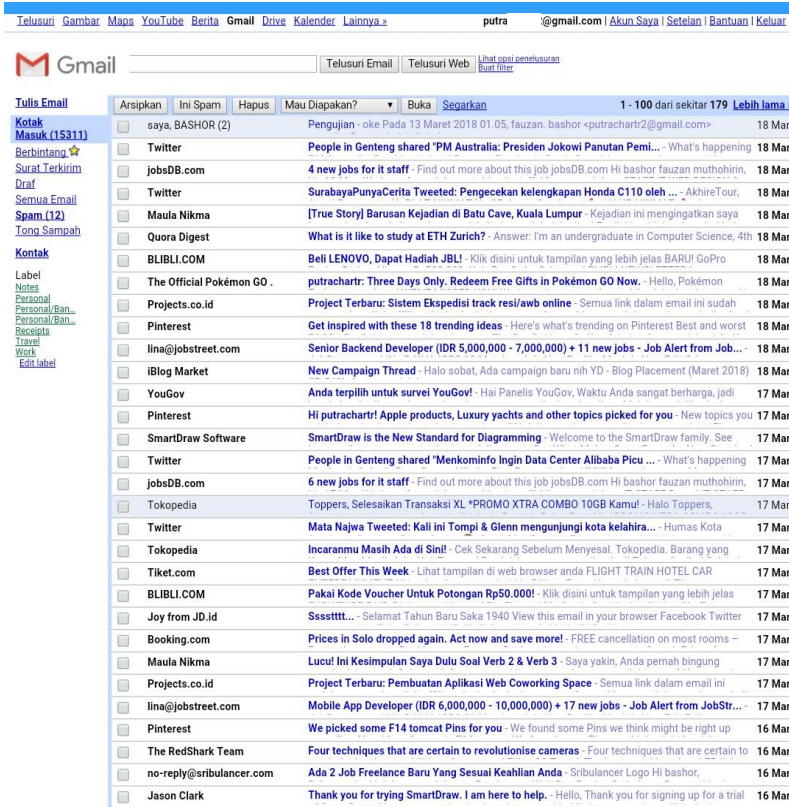


Figure 6. Desktop Display on Smartphone

In figure 6 is an email appearance of the android browser after the change to the desktop. The next stage is to determine and open the email to be carried out on the android-based email acquisition.

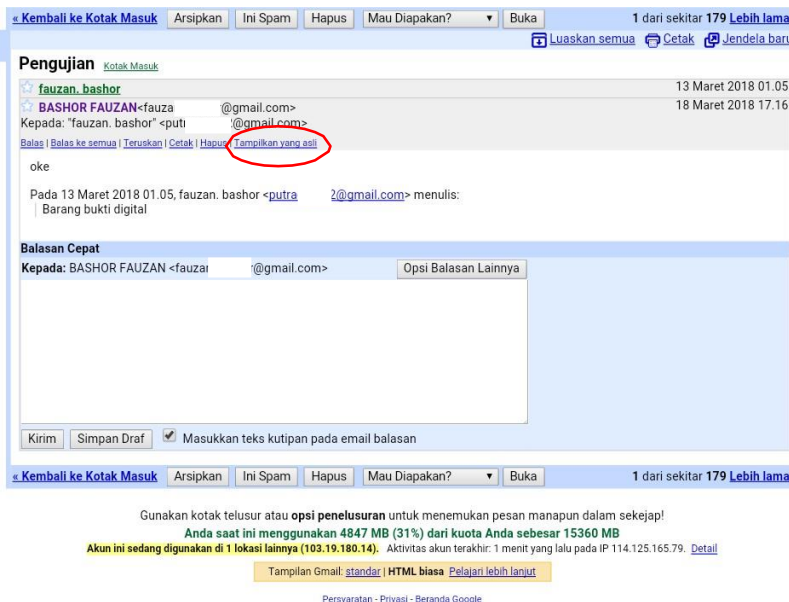


Figure 7. Opening Emails that Will be Forensic

In figure 7 is the opened email view and to make the acquisition of the email should open the email header by click the original view, See red circle.



```

Delivered-To: putrac@gmail.com
Received: by 10.46.57.6 with SMTP id g6csp14781461ja;
Sun, 18 Mar 2018 03:16:21 -0700 (PDT)
X-Received: by 10.80.221.7 with SMTP id t7mr9393017edk.192.1521368181621;
Sun, 18 Mar 2018 03:16:21 -0700 (PDT)
ARC-Seal: i=1; a=rsa-sha256; t=1521368181; cv=none;
d=google.com; s=arc-20160816;
b=MqIecf/tNVGyunk/MFA21SHKHnrF1HmTz19Hwaa/TNyp74R4HY1Vg1kH3TwnOwtaRC
9GTLe1628WwrNrYztrBktg4b1ar+2mBPajIZGz+f0oC1WRDNHXHBDdPsSmzt+6y/awoL
ZLsMFIS5pwxJKLRaPut6Ih2Z2618F6sFyITyG7NuyQz5Vm6kEnmBgk8M026u0PtGDZ
q1K4Fu2uCL9SEhFDH3zL4yGBx1zU81t65J1tYucBPK4KwNkHab5QldGf6Wzy/XXkxh3W
00uhfMqVNIxCGtL801ZLPPoVJnpLhmJSy0+dB2+0V0mRewjrkAurTKwdOQq1ZAHxGU9
xSLA=
ARC-Message-Signature: i=1; a=rsa-sha256; c=relaxed/relaxed; d=google.com; s=arc-
20160816;
h=to:subject:message-id:date:from:references:in-reply-to:mime-version
:dkim-signature:arc-authentication-results;
bh=OR0jRqipyPqBbK3ui7wZjXy0TGz5LdUPrgVnh9W0wY8=;
b=BsjdPzNnpJrdR8qRYLEDLjKbELGI5Y2oTCAY+gUtR91hZ0B97g1EgISs6dABKUYJu
SgccVlft8cgnuV0BFdZHLZEajcRuiUmXeRF5DFKxe9BvXxKWgyrPf19tWaVgKB2DJ
ewEiVuyZ17QdhrtsHaaCcrW5Ac9f0jgOmR+V67AnMod19kLXpbcm8rOTdr3Ja560
jCv2BR2POUAVc7D+iw4tbFoyOv54JnpNJKi6Xdc7ZsKg65i00CMkzIm1cw6QjAYxKu0x
iBqwhuNF3QUp4fBWGc8j5NG1nc83MDRILk1VfTelGhZ/1/3GCYQvnt8xhDVIenn4Iev
TTFg=
ARC-Authentication-Results: i=1; mx.google.com;
dkim=pass header.i=@gmail.com header.s=20161025 header.b=QZo0ZmN6;
spf=pass (google.com: domain of fauzan@gmail.com designates
209.85.220.41 as permitted sender) smtp.mailfrom=fauzan@gmail.com;
dmarc=pass (p=NONE sp=QUARANTINE dis=NONE) header.from=gmail.com
Return-Path: <fauzan@gmail.com>
Received: from mail-sor-f41.google.com (mail-sor-f41.google.com. [209.85.220.41])
by mx.google.com with SMTPS id l33sor5571291edc.0.2018.03.18.03.16.21
for <putrac@gmail.com>
(Google Transport Security);
Sun, 18 Mar 2018 03:16:21 -0700 (PDT)
Received-SPF: pass (google.com: domain of fauzan@gmail.com designates
209.85.220.41 as permitted sender) client-ip=209.85.220.41;
Authentication-Results: mx.google.com;
dkim=pass header.i=@gmail.com header.s=20161025 header.b=QZo0ZmN6;
spf=pass (google.com: domain of fauzan@gmail.com designates
209.85.220.41 as permitted sender) smtp.mailfrom=fauzan@gmail.com;
dmarc=pass (p=NONE sp=QUARANTINE dis=NONE) header.from=gmail.com
DKIM-Signature: v=1; a=rsa-sha256; c=relaxed/relaxed;
d=gmail.com; s=20161025;
h=mime-version:in-reply-to:references:from:date:message-id:subject:to;
bh=OR0jRqipyPqBbK3ui7wZjXy0TGz5LdUPrgVnh9W0wY8=;
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3T890Vum6DeBUVXR1c570DCW8ueMTsEy3nGQPaH080FIQzKkMSvrdrJp7XYZJbkMo60m
CAJQkFo8ThvLkY/xbkKKg++Xj1Bfe81/rzrxT16DbSh2y28UtD521L1IYkM+yxfkPIm
ULEUdkUM3p3579CvRGF/ZTgv0KYduLiwWHh3mMDuAjN7fLecAz35Xqdon3M6+Gdi5YX
zXpTs6os2NPYIDtCCcArJc0lyEYhrAIV5JPx19+LIBzNKIGBihRfrgsIz/0vUmmk5Shc
x7WQ=
X-Google-DKIM-Signature: v=1; a=rsa-sha256; c=relaxed/relaxed;
d=1e100.net; s=20161025;
h=x-gm-message-state:mime-version:in-reply-to:references:from:date
:message-id:subject:to;
bh=OR0jRqipyPqBbK3ui7wZjXy0TGz5LdUPrgVnh9W0wY8=;
b=jg9oH+wCTyutEA7rnVBGgkTLq655IRw66hhdMfcaRembnLIYdkfQjTrbH7azeCu
DzCd77r1mVBACOXrFAFY001110Gt3a3VPV99aC480J24xrcwKJnqFyPOJE13onUwCh
7D/9umpU+U1hfmbWzNYDc3nPJT5H0HZdps05NU9Kf8576I3+DIFva0PaSRnuDu1U1JD

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Figure 8. Email Header Display

In Figure 8 is an email header display that will be used in the analysis phase to make the acquisition of email.

3.3 Analysis

At this stage, perform an analysis of the acquisition process of the email, which generates the sender's IP address, recipient's IP address, sender's email address, email protocol, sender's email time, email time received, and email encryption obtained from email headers. This research object focuses on acquisition of IP address of the email. The results can be seen in Figure 9.



Figure 9. IP Address Sender Email



### 3.4. Reporting

At this stage, it is a digital forensic report from the email acquisition process. Email sent from someone via google mail has been found IP address of sender email in the email header, then IP address can be used as digital evidence.

### 4. Conclusion

From the research that has been done, the growth of information and communication technology is very fast. Email is one of the media used to exchange data information, images and others. As the rapid development of information and communication exchanges, causes cyber crime to flourish. So for the perpetrators of cyber crime or cybercrime required evidence. Crimes committed by cybercrime can be forensic on email. This research will do forensic on emails by way of acquisition of android based emails as digital evidence by using forensic methods of the National Institute of Standards and Technology (NIST). At the collection stage of evidence carried out on the smartphone Android lollipop 5.0.2 type Xiaomi Mi4i, to make an acquisition on Android-based email then the email must be opened using the browser. In this study using the original browser from android. In the testing phase, from a series of processes that have been done in obtaining the IP address of the sender in the email header, other than the sender's IP address is found also the recipient's IP address, sender's email address, email protocol, sender's email time, email time received and email encryption. In the final stages of the acquisition process in email successfully carried out by obtaining an IP address sends email in the header as digital evidence. In the next study can tracker the IP address of the sender of the email.

### References

- [1] Wearesocial, "Digital in 2018: global overview," 2018.
- [2] Jakpat, "Which And Why: E-Mail Service and Web Browser of Choice," 2017.
- [3] J. Rose, "E-Mail Security Risks: Taking Hacks at the Attorney-Client Privilege," in *Rutgers Computer & Tech. LJ*, vol. 23, 1997, p. 179.
- [4] M. N. Faiz, R. Umar, and A. Yudhana, "Analisis Live Forensics Untuk Perbandingan Keamanan Email Pada Sistem Operasi Proprietary," *J. Ilm. Ilk.*, vol. 8, no. 3, pp. 242–247, 2016.
- [5] D. Mualfah and I. Riadi, "Network Forensics For Detecting Flooding Attack On Web Server," *IJCSIS) Int. J. Comput. Sci. Inf. Secur.*, vol. 15, no. 2, pp. 326–331, 2017.
- [6] Agus Tri P.H, "Cybercrime Dalam Perspektif Hukum Pidana," Universitas Muhammadiyah Surakarta, 2010.
- [7] I. Riadi, R. Umar, and A. Firdonsyah, "Identification Of Digital Evidence On Android ' s Blackberry Messenger Using NIST Mobile," *Int. J. Comput. Sci. Inf. Secur.*, vol. 15, no. May, pp. 1–7, 2017.
- [8] Y. Hoiriyah, H., Sugiantoro, B., Prayudi, "Investigasi Forensik Pada E-Mail Spoofing Menggunakan Metode Header Analysis," *J. Ilm. DASI*, vol. 17, no. DESEMBER, pp. 20–25, 2016.
- [9] M. D. R. Wahyudi, "Deteksi e-mail palsu dengan mempergunakan," *J. Teknol.*, vol. 1, pp. 119–126, 2008.
- [10] Y. Zulfadhilah, M., Riadi, I., Prayudi, "Log Classification using K-Means Clustering for Identify Internet User Behaviors," *Int. J. Comput. Appl.*, vol. 154, no. 3, pp. 34–39, 2016.
- [11] I. Riadi, J. E. Istiyanto, A. Ashari, and S. Subanar, "Internet Forensics Framework Based-on Clustering."
- [12] M. Agarwal and M. Gupta, "Systematic digital forensic investigation model," *J. Comput.*, no. 5, pp. 118–131, 2011.
- [13] R. Indonesia, *Undang-Undang Republik Indonesia Nomor 11 Tahun 2008 Tentang Informasi Dan Transaksi Elektronik. Departemen Komunikasi Dan Informatika, Republik Indonesia*. 2008.
- [14] M. N. Faiz, R. Umar, and A. Yudhana, "Implementasi Live Forensics untuk Perbandingan Browser pada Keamanan Email," *JISKa*, vol. 1, no. February, pp. 108–114, 2017.
- [15] G. M. Umar, R., Riadi, I., Zamroni, "A Comparative Study of Forensic Tools for WhatsApp Analysis using NIST Measurements," *Int. J. Adv. Comput. Sci. Appl.*, vol. 8, no. 12, pp. 69–75, 2017.



2. Lampiran 2

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2018-04-21 01:38

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Universitas Muhammadiyah Malang  
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aguseko@umm.ac.id

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Abstract:

The abstract contains of research problem, method being used, research finding and results, and conclusions:

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The clarity of research problem, comparison with the previous method, and contribution to the literature

:

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Research methodology :

Describe clearly the method being used in research (e.g., experimental procedures, algorithms, flow diagrams, analytical tools, ect.)

:

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Research methodology:

Is the method being used can be well understood and possible to implemented?

:

Yes

Research Result and discussion:

The presentation of result, the conformity of methodology being used, the depth of result analysis, and the research findings.

:

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Conclusion :

The conclusion contains justification from evidence being presented

:

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Title:

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Abstract:

The abstract contains of research problem, method being used, research finding and results, and conclusions:

Below Average



Introduction :

The clarity of research problem, comparison with the previous method, and contribution to the literature

:

Below Average

Research methodology :

Describe clearly the method being used in research (e.g., experimental procedures, algorithms, flow diagrams, analytical tools, ect.)

:

Average

Research methodology:

Is the method being used can be well understood and possible to implemented?

:

Yes

Research Result and discussion:

The presentation of result, the conformity of methodology being used, the depth of result analysis, and the research findings.

:

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Conclusion :

The conclusion contains justification from evidence being presented

:

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References:

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3. Conclusion: what the results important from the research?

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Write the recommendation of overall article's content::

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2. Aim/objective(s)/problem statement: explain more clearly
3. Conclusion: what the results important from the research?

**based on the above revision, some parts of the article need to be fixed**

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### 3. Lampiran 3

The screenshot displays a journal submission management interface. The top navigation bar includes the journal title "Kinetik: Game Technology, Information System, Comp...", a "Tasks" indicator with a "0" badge, and user options for "English", "View Site", and "bashorfauzan". The left sidebar contains navigation links for "Submissions", "Kinetik-Management", and "Join As Reviewer". The main content area shows the submission ID "637" and author "Umar et al." for the article "Acquisition of Email Service Based Android Using NIST". A "Library" button is visible in the top right. The workflow progress is shown with tabs for "Workflow" and "Publication", and sub-tabs for "Submission", "Review", "Copyediting", and "Production". The current stage is "Round 1". Below this, there is a section for "Reviewer's Attachments" with a search icon and the text "No Files". A red rectangular box highlights the "Revisions" section, which includes a search icon, an "Upload File" button, and a table of revision entries. The table has columns for a revision ID, description, date, and type. Below the revisions is a "Review Discussions" section with an "Add discussion" button and a table with columns for "Name", "From", "Last Reply", "Replies", and "Closed".

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Name	From	Last Reply	Replies	Closed
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### Abstract

Email is one of the results of the development of information and communication technology. Email is widely used to exchange information by sending and receiving data, such as document files, images, correspondence and others. With the development of technology and information causing crimes in communicating also growing, the perpetrators of cybercrime commonly referred to as cybercrime. Any crime on email made by cyber crime will surely leave evidence, such as IP Address and others. Evidence of the crime can be used in the trial, so it is necessary forensic on the email. The research will do forensics on emails by way of android-based email acquisition using the method used in this study is a forensic method based on upon the available guidelines prepared by the National Institute of Standards and Technology (NIST). The acquisition process on email using smartphone android xiami with android version lollipop, from a series of research using forensic methods NIST got an IP address in the email header. IP addresses that have been found can be used digital evidence.

**Keywords:** Email, Evidence, Forensics, IP Address, NIST

### 1. Introduction

In recent decades, mobile phone users in Indonesia have been increased from 265 people with 50% penetration is internet users from 50% of internet users that 45% access various sources using mobile [1]. Among the most popular digital services in Indonesia are Gmail, Yahoo Mail and Whatsapp. The growth and development of information and communication technology has led us to exchange information via email and with the help of a web browser inside android. Inside the smartphone android can also be installed web browser like google chrome, mozilla Firefox, opera, and others. There are 5 emails frequently used by Indonesian people, like Figure 1 [2].

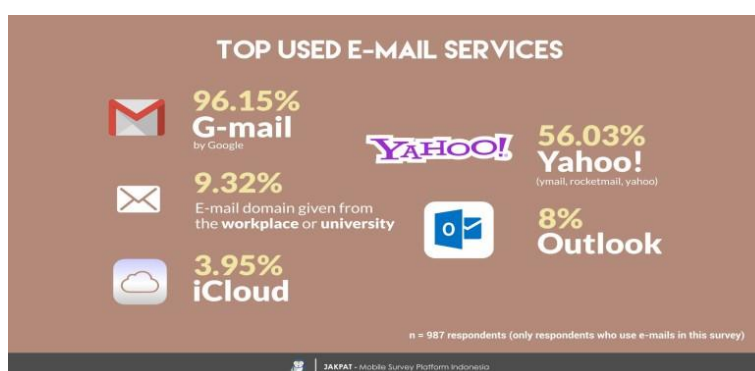


Figure 1. Top Email Used by Indonesian.

There are some emails that are often used by Indonesian people, like Gmail 96.15%, 56.03% yahoo, workplace or university 9:32%, outlook 8% and iCloud 3.95% [2]. As for the reason they use the browser for various reasons such as a faster loading process, easy user interface, safe from viruses, offers many functional features and offers themes for choice [2]. With the increasing number of users cannot be denied anymore if there are impacts in both the positive

*Citation* : Umar, R; Riadi, I, Fauzan Muthohirin, Bashor. Acquisition of Email Service Based Android Using NIST, [S.l.], v. 1, n. 1, p. 1-8, oct. 2016. doi:<http://dx.doi.org/10.22219/kinetik.v1i1.3>

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and negative impacts. The positive impact is to help complete the activity quickly, and can help a difficult job. Since the negative impact is the abuse of the technology itself is done by people who are not responsible. Email also has a weakness so it can be attacked, one of the crimes in the email there is the theft of username and password [3],[4],[5]. Crime in cyberspace called cybercrime. Cybercrime is a type of crime associated with utilizing information and communication technologies to gain unauthorized and unlimited access rights, and has a strong characteristic with a technological engineering that relies on a high level of security, from information conveyed and accessed by Internet users [6].

In the crime of cybercrime will leave the evidence, the evidence can be both digital and electronic evidence [7]. Digital evidence can be seen when criminal proceedings take place or when digital evidence has been stored, digital evidence can be handled exclusively by digital forensic science using tools to solve and draw conclusions from criminal cases on digital evidence obtained. In the email is genuine or fake can be detected using a couple of ways to view headers email [8], digital signatures, and read the log [9],[10],[11]. The handling of crime involving computer technology is still very common for now. Digital forensics is the use of science and methods for discovering, collecting, securing, analyzing, interpreting and presenting digital evidence relating to cases occurring for reconstruction purposes and the validity of the judicial process [12].

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From the background above, this research will do forensic on email by way of acquisition of android based email to get IP address of sender. The sender's IP address is used as digital evidence. This study uses forensic methods based on guidelines prepared by the National Institute of Standards and Technology (NIST).

## 2. Research Method

the previous research about email, the study conducted a forensic investigation on email spoofing by examining and comparing the values contained in some email headers defined as email spoofing detection parameters. The parameters used in this study are the headers 'From', 'Message-ID', 'Date' and 'Received'. This research uses header analysis method.

In this research using National Institute of Standards and Technology (NIST) method is one method to analyze digital evidence or to obtain information from digital evidence. Here are the steps of the NIST method[15].

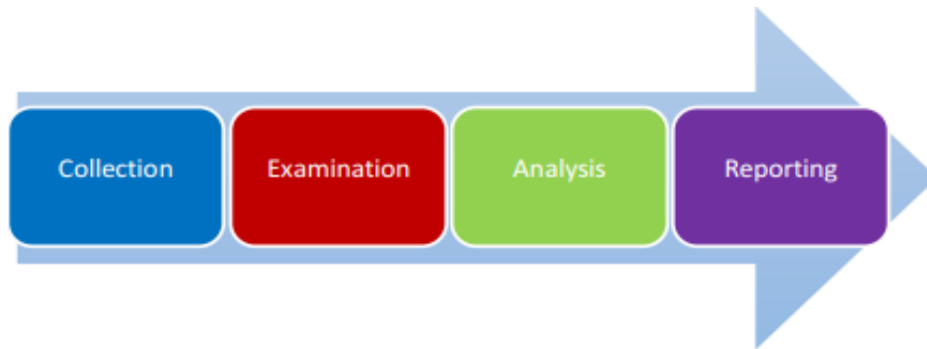


Figure 2. Stage method of the National Institute of Standards and Technology

The following explanation in Figure 2:

- Collection is identify, label, record and retrieve data from relevant data sources, then follow data integrity preservation procedures.
- Examination is the data has been collected forensic using combinations of scenarios, both manually and automatically, assess and release of data in accordance with the data requirements and maintaining the authenticity of data.
- Analysis is Perform analysis of the results of investigations by using the correct method both technically and legally to get useful information and answers questions that encourage the collection and examination.
- Reporting is Report the results of an analysis that includes a description of the action taken, specifies the tool used and the procedure selected, and the required action, then reports the results obtained.

### 3. Results and Discussion

The results of this study conducted the appointment of emails that have been sent by someone to us and then the email is forensic, forensic email is an email from google is google mail or often called Gmail. Here is the process of acquiring on android based emails using the NIST method:

#### 3.1. Collection

At this stage that is collecting goods on smartphone owners, the smartphone used in Xiaomi Mi4i with android version lollipop 5.0.2. In Figure 3 is a conceptual stage in the collection process.

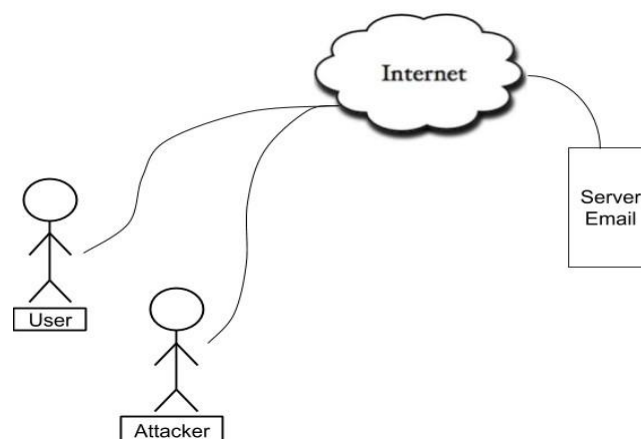


Figure 3. Conceptual Stages of collection

#### 3.2. Examination

At this stage, how to get digital evidence in email. This study uses the original browser from android system with version 9.4.10. Here is the stage of appointment of digital evidence.

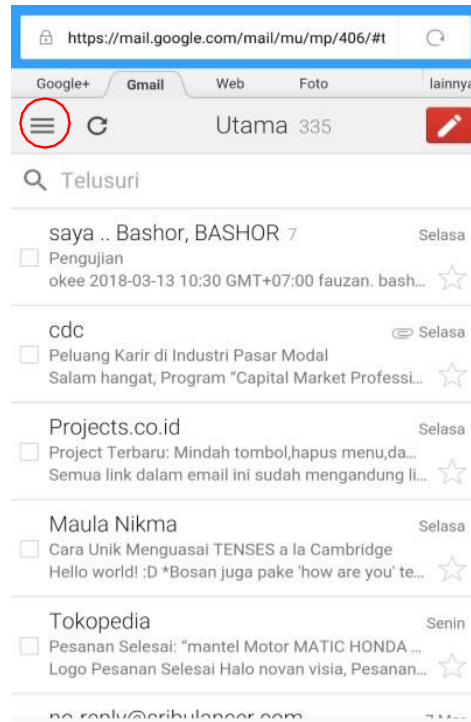


Figure 4. Initial View of Email

In Figure 4 the initial display when opening the email through the android browser. the acquisition process in the email then must be changed in the desktop display and to change the display to the desktop open the settings menu, see red circle.

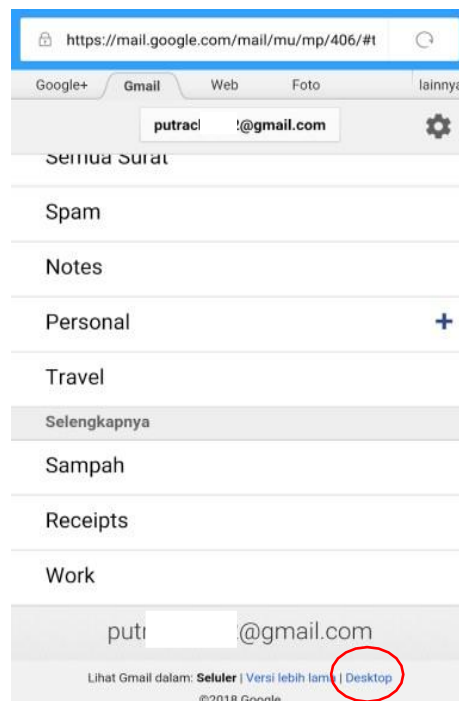


Figure 5. Changing the Display to Desktop

In Figure 5 is a display setting on Gmail opened using android browser and then click on the desktop, see the red circle.



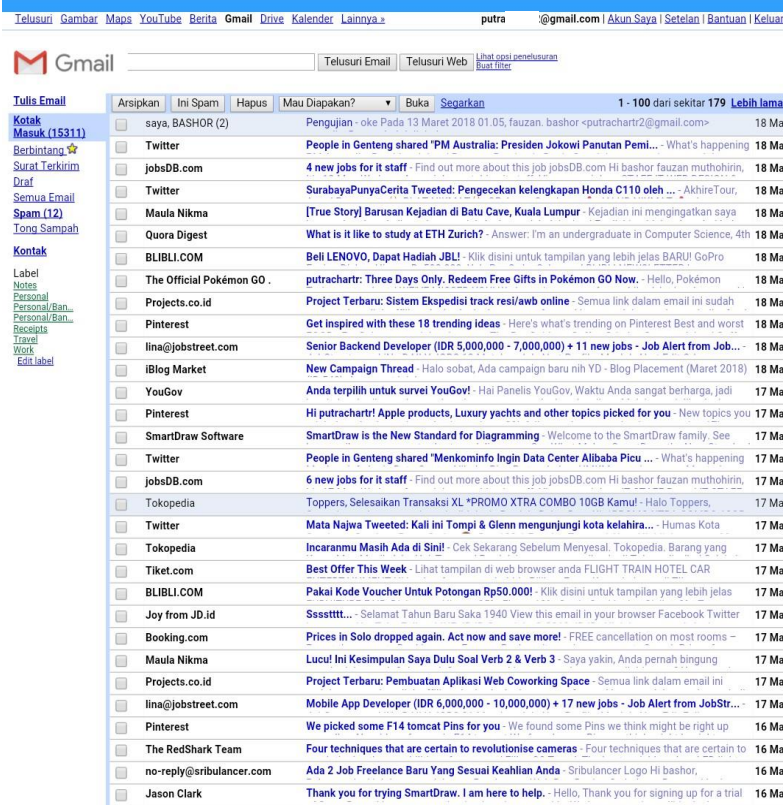


Figure 6. Desktop Display on Smartphone

In figure 6 is an email appearance of the android browser after the change to the desktop. The next stage is to determine and open the email to be carried out on the android-based email acquisition.

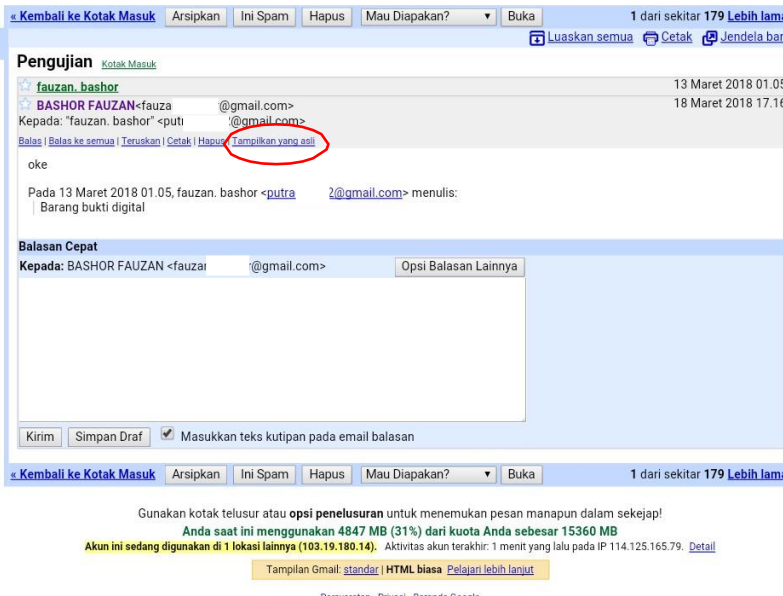


Figure 7. Opening Emails that Will be Forensic

In figure 7 is the opened email view and to make the acquisition of the email should open the email header by click the original view, See red circle.

```

Delivered-To: putrac@gmail.com
Received: by 10.46.57.6 with SMTP id g6csp14781461ja;
Sun, 18 Mar 2018 03:16:21 -0700 (PDT)
X-Received: by 10.80.221.7 with SMTP id t7mr9393017edk.192.1521368181621;
Sun, 18 Mar 2018 03:16:21 -0700 (PDT)
ARC-Seal: i=1; a=rsa-sha256; t=1521368181; cv=none;
d=google.com; s=arc-20160816;
b=MqIecf/tNVGyunk/MFA21SHKHnrF1HmTz19Hwaa/TNyp74R4HY1Vg1kH3TwnOwtaRC
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20160816;
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dkim=pass header.i=@gmail.com header.s=20161025 header.b=QZo0ZmN6;
spf=pass (google.com: domain of fauzan@gmail.com designates
209.85.220.41 as permitted sender) smtp.mailfrom=fauzan@gmail.com;
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Return-Path: <fauzan@gmail.com>
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by mx.google.com with SMTPS id l33sor5571291edc.0.2018.03.18.03.16.21
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:message-id:subject:to;
bh=OR0jRqipyPqBbK3ui7wZjXy0TGz5LdUPrgVnh9W0wY8=;
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7D/9umpU+U1hffmBwzNYDc3nPJT5H0HZdps05NU9Kf8576I3+DIFva0PaSRnuDuU1Y1JD

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Figure 8. Email Header Display

In Figure 8 is an email header display that will be used in the analysis phase to make the acquisition of email.

### 3.3 Analysis

At this stage, perform an analysis of the acquisition process of the email, which generates the sender's IP address, recipient's IP address, sender's email address, email protocol, sender's email time, email time received, and email encryption obtained from email headers. This research object focuses on acquisition of IP address of the email. The results can be seen in Figure 9.



Figure 9. IP Address Sender Email

### 3.4. Reporting

At this stage, it is a digital forensic report from the email acquisition process. Email sent from someone via google mail has been found IP address of sender email in the email header, then IP address can be used as digital evidence.

### 4. Conclusion

From the research that has been done, the growth of information and communication technology is very fast. Email is one of the media used to exchange data information, images and others. As the rapid development of information and communication exchanges, causes cyber crime to flourish. So for the perpetrators of cyber crime or cybercrime required evidence. Crimes committed by cybercrime can be forensic on email. This research will do forensic on emails by way of acquisition of android based emails as digital evidence by using forensic methods of the National Institute of Standards and Technology (NIST). At the collection stage of evidence carried out on the smartphone Android lollipop 5.0.2 type Xiaomi Mi4i, to make an acquisition on Android-based email then the email must be opened using the browser. In this study using the original browser from android. In the testing phase, from a series of processes that have been done in obtaining the IP address of the sender in the email header, other than the sender's IP address is found also the recipient's IP address, sender's email address, email protocol, sender's email time, email time received and email encryption. In the final stages of the acquisition process in email successfully carried out by obtaining an IP address sends email in the header as digital evidence. In the next study can tracker the IP address of the sender of the email.

### References

- [1] Wearesocial, "Digital in 2018: global overview," 2018.
- [2] Jakpat, "Which And Why: E-Mail Service and Web Browser of Choice," 2017.
- [3] J. Rose, "E-Mail Security Risks: Taking Hacks at the Attorney-Client Privilege," in *Rutgers Computer & Tech. LJ*, vol. 23, 1997, p. 179.
- [4] M. N. Faiz, R. Umar, and A. Yudhana, "Analisis Live Forensics Untuk Perbandingan Keamanan Email Pada Sistem Operasi Proprietary," *J. Ilm. Ilk.*, vol. 8, no. 3, pp. 242–247, 2016.
- [5] D. Mualfah and I. Riadi, "Network Forensics For Detecting Flooding Attack On Web Server," *IJCSIS) Int. J. Comput. Sci. Inf. Secur.*, vol. 15, no. 2, pp. 326–331, 2017.
- [6] Agus Tri P.H, "Cybercrime Dalam Perspektif Hukum Pidana," Universitas Muhammadiyah Surakarta, 2010.
- [7] I. Riadi, R. Umar, and A. Firdonsyah, "Identification Of Digital Evidence On Android ' s Blackberry Messenger Using NIST Mobile," *Int. J. Comput. Sci. Inf. Secur.*, vol. 15, no. May, pp. 1–7, 2017.
- [8] Y. Hoiriyah, H., Sugiantoro, B., Prayudi, "Investigasi Forensik Pada E-Mail Spoofing Menggunakan Metode Header Analysis," *J. Ilm. DASI*, vol. 17, no. DESEMBER, pp. 20–25, 2016.
- [9] M. D. R. Wahyudi, "Deteksi e-mail palsu dengan mempergunakan," *J. Teknol.*, vol. 1, pp. 119–126, 2008.
- [10] Y. Zulfadhilah, M., Riadi, I., Prayudi, "Log Classification using K-Means Clustering for Identify Internet User Behaviors," *Int. J. Comput. Appl.*, vol. 154, no. 3, pp. 34–39, 2016.
- [11] I. Riadi, J. E. Istiyanto, A. Ashari, and S. Subanar, "Internet Forensics Framework Based-on Clustering."
- [12] M. Agarwal and M. Gupta, "Systematic digital forensic investigation model," *J. Comput.*, no. 5, pp. 118–131, 2011.
- [13] R. Indonesia, *Undang-Undang Republik Indonesia Nomor 11 Tahun 2008 Tentang Informasi Dan Transaksi Elektronik. Departemen Komunikasi Dan Informatika, Republik Indonesia*. 2008.
- [14] M. N. Faiz, R. Umar, and A. Yudhana, "Implementasi Live Forensics untuk Perbandingan Browser pada Keamanan Email," *JISKa*, vol. 1, no. February, pp. 108–114, 2017.
- [15] G. M. Umar, R., Riadi, I., Zamroni, "A Comparative Study of Forensic Tools for WhatsApp Analysis using NIST Measurements," *Int. J. Adv. Comput. Sci. Appl.*, vol. 8, no. 12, pp. 69–75, 2017.



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Universitas Muhammadiyah Malang  
Phone 081233084984  
[aguseko@umm.ac.id](mailto:aguseko@umm.ac.id)

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## Acquisition of Email Service Based Android Using NIST

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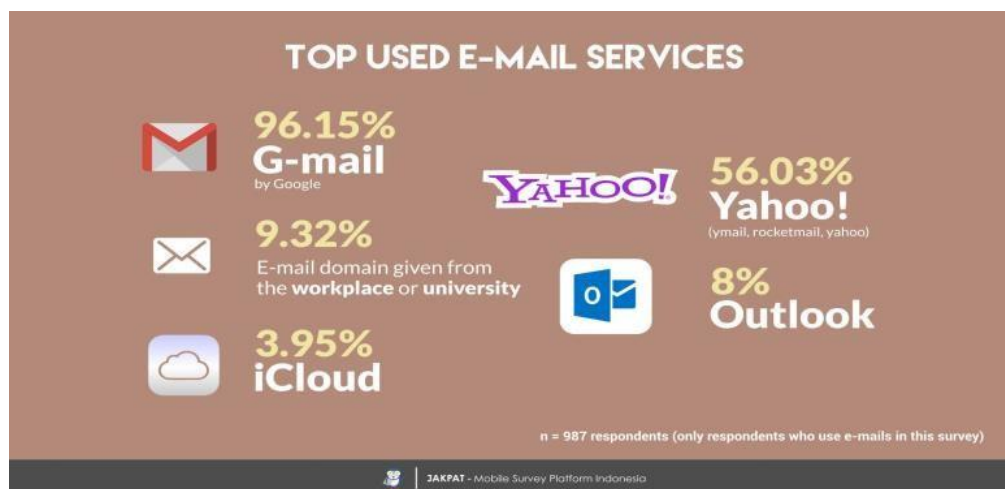


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2. Examination is the data has been collected forensic using combinations of scenarios, both manually and automatically, assess and release of data in accordance with the data requirements and maintaining the authenticity of data.

3. Analysis is Perform analysis of the results of investigations by using the correct method both technically and legally to get useful information and answers questions that encourage the collection and examination.
4. Reporting is Report the results of an analysis that includes a description of the action taken, specifies the tool used and the procedure selected, and the required action, then reports the results obtained.

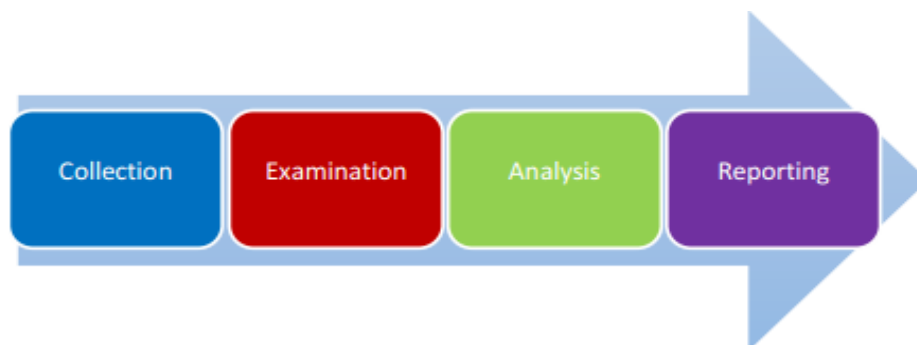


Figure 2. Stage Method of the National Institute of Standards and Technology

### 3. Results and Discussion

The results of this study conducted the appointment of emails that have been sent by someone to us and then the email is forensic, forensic email is an email from google mail or often called Gmail. Here is the process of acquiring on android based emails using the NIST method:

#### 3.1 Collection

At this stage that is collecting goods on smartphone owners, the smartphone used in Xiaomi Mi4i with android version lollipop 5.0.2. In Figure 3 is a conceptual stage in the collection process.

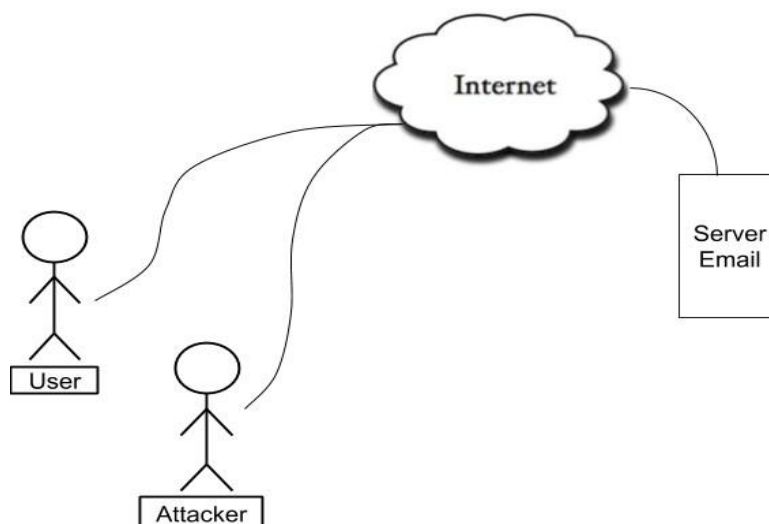


Figure 3. Conceptual Stages of Collection

#### 3.2 Examination

At this stage, how to get digital evidence in email. This study uses the original browser from android system with version 9.4.10. Here is the stage of appointment of digital evidence.

In Figure 4 the initial display when opening the email through the android browser. the acquisition process in the email then must be changed in the desktop display and to change the display to the desktop open the settings menu, see red circle.

In Figure 5 is a display setting on Gmail opened using android browser and then click on the desktop, see the red circle.

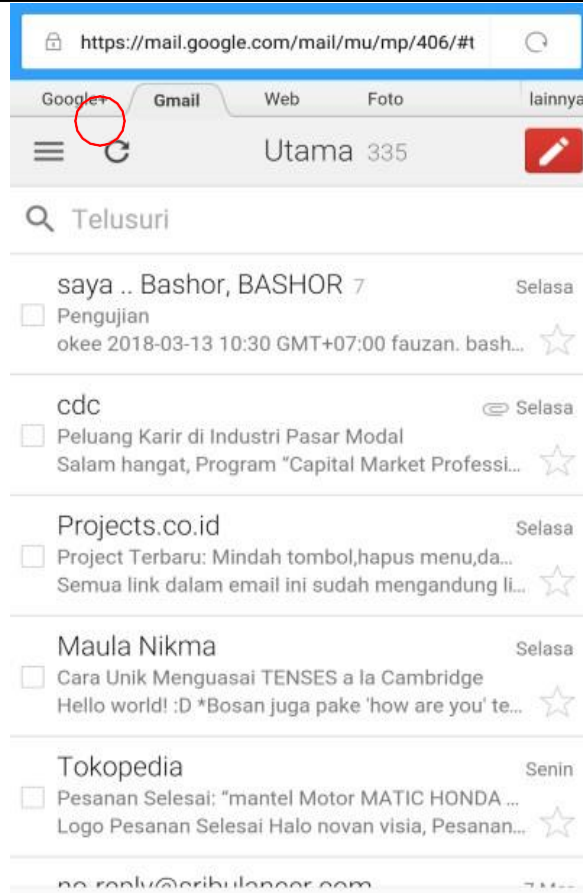


Figure 4. Initial View of Email

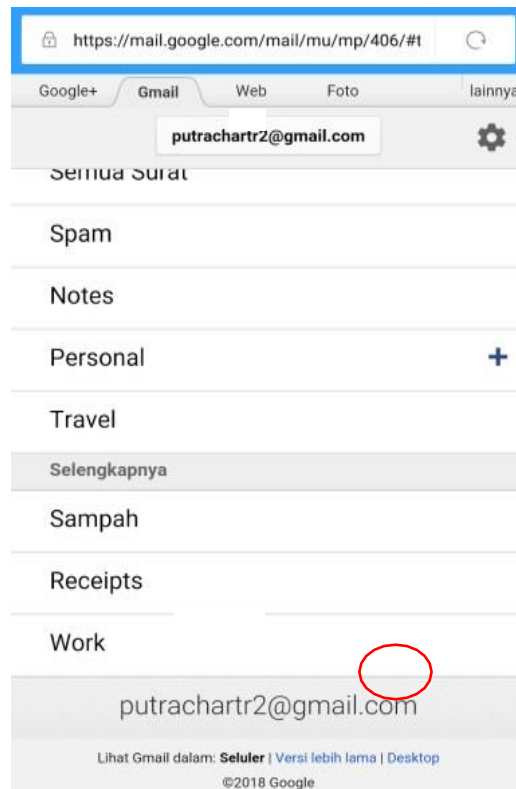


Figure 5. Changing the Display to Desktop

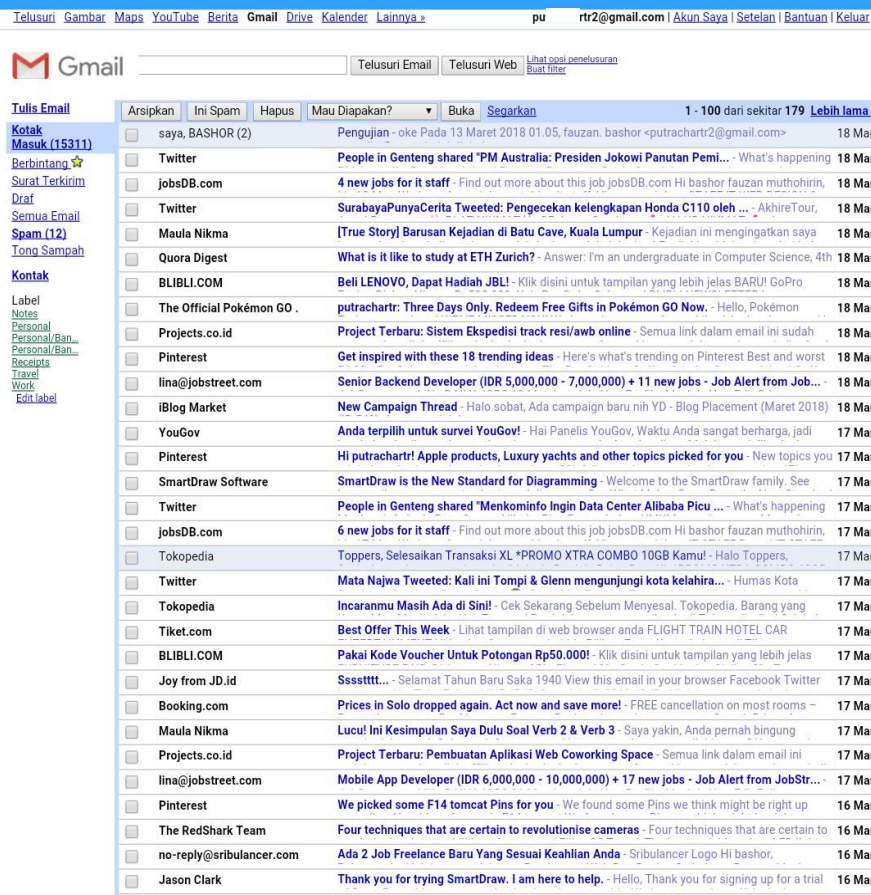


Figure 6. Desktop Display on Smartphone

In Figure 6 is an email appearance of the android browser after the change to the desktop. The next stage is to determine and open the email to be carried out on the android-based email acquisition.

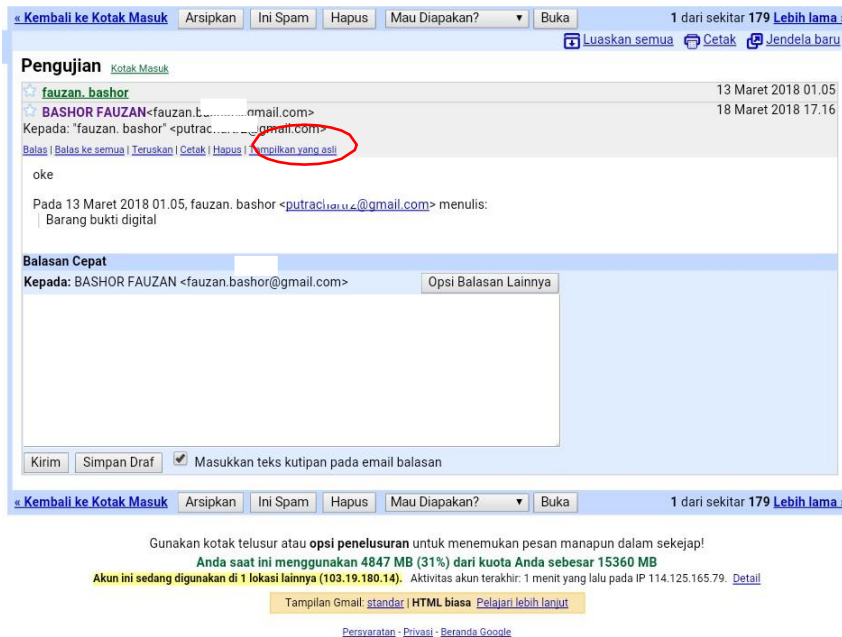


Figure 7. Opening Emails that Will be Forensic



In Figure 7 is the opened email view and to make the acquisition of the email should open the email header by click the original view, See red circle.

```

Delivered-To: putrac@gmail.com
Received: by 10.46.57.6 with SMTP id g6csp14781461ja;
Sun, 18 Mar 2018 03:16:21 -0700 (PDT)
X-Received: by 10.80.221.7 with SMTP id t7mr9393017edk.192.1521368181621;
Sun, 18 Mar 2018 03:16:21 -0700 (PDT)
ARC-Seal: i=1; a=rsa-sha256; t=1521368181; cv=none;
d=google.com; s=arc-20160816;
b=MqIecf/tNVGuynk/MFA21SHKHnrF1HmtZ19Hwaa/TNyp74R4HY1Vg1kH3TwnOwtaRC
96TLe1628WwvNryZtRbktg4b1ar+2mBPajizGz+f0c1WRDNHXHBDdPSmzt+6y/awoL
ZLsMfI5SpvxJKLrRaPut61h2Z2618F6sFyITyG7fNuyQzSvm6kENmBgK8M026u0PTGDZ
q1k4Fu2uCL9SEhFDH3zL4yGbxLzU81t65j1tYucBPK4KwNkHab5QldGF6Wzy/XKxk3W
0ouHfMQvNIXcGL801ZLP0VjnlhmJSy0+dB2+0V0mRewujrKAurTKwd0Q12AHxGU9
xsLA==
ARC-Message-Signature: i=1; a=rsa-sha256; c=relaxed/relaxed; d=google.com; s=arc-
20160816;
h=to:subject:message-id:date:from:references:in-reply-to:mime-version
:dkim-signature:arc-authentication-results;
bh=OR0JRqipyPqBbK3ui7wzjXy0TGz5LdUPrgVnh9W0wY8=;
b=BsjdPzNnpjRdr8QRyLEdLjKbELg15V2oTCAy+gUR91hZOB97g1EgISS6dABKUYJU
SgccVlft8cgnuV0BFDZHLVejajcRUIUmXerF5DFKxe9gBvXxKwgyrPF19twaVgKB2DJ
ewE1VUyZ17QdhrtsHaaccRWSAc9d9fojOmR+V67AnMod10g19KLXpbcm8ROTdr3Ja56o
jCv2BR2POUAVC7D+iw4tbFoyOv54JnpNJKi6Xdc7ZsKg6SiOOCmkzIm1cw6QjAYxKu0x
iBqWhuNF3QUp4fWBwG8j5NG1nc83MDRILk1VfTeLGHZ/1/3GcyQvnt8xhDVIenn41eV
TTFg==
ARC-Authentication-Results: i=1; mx.google.com;
dkim=pass header.i=@gmail.com header.s=20161025 header.b=QZo0ZmN6;
spf=pass (google.com: domain of fauzan@gmail.com designates
209.85.220.41 as permitted sender) smtp.mailfrom=fauzan@gmail.com;
dmarc=pass (p=NONE sp=QUARANTINE dis=NONE) header.from=gmail.com
Return-Path: <fauzan@gmail.com>
Received: from mail-sor-f41.google.com (mail-sor-f41.google.com. [209.85.220.41])
by mx.google.com with SMTPS id l33sor5571291edc.0.2018.03.18.03.16.21
for <putrac@gmail.com>
(Google Transport Security);
Sun, 18 Mar 2018 03:16:21 -0700 (PDT)
Received-SPF: pass (google.com: domain of fauzan@gmail.com designates
209.85.220.41 as permitted sender) client-ip=209.85.220.41;
Authentication-Results: mx.google.com;
dkim=pass header.i=@gmail.com header.s=20161025 header.b=QZo0ZmN6;
spf=pass (google.com: domain of fauzan@gmail.com designates
209.85.220.41 as permitted sender) smtp.mailfrom=fauzan@gmail.com;
dmarc=pass (p=NONE sp=QUARANTINE dis=NONE) header.from=gmail.com
DKIM-Signature: v=1; a=rsa-sha256; c=relaxed/relaxed;
d=gmail.com; s=20161025;
h=mime-version:in-reply-to:references:from:date:message-id:subject:to;
bh=OR0JRqipyPqBbK3ui7wzjXy0TGz5LdUPrgVnh9W0wY8=;
b=QZo0ZmN6/7c8QcGxRQNYC0mFkSjv4JQAL4jZORdhqceKDR30Mb70u4VW0g9x9E4t
3T890Um6DeBUvXrlc570DCW8ueMTsEy3nGQPaH080F1QzkkMSvdrjP7XVZJbkMo60m
CAJQkFo8ThvLkY/xbkKkg+Xj1Bfe01rZrXtL60bSh2yZ8UtDSZ1LiIYkM+yxfkPIH
ULEUdKUM3p3579cVRGF/ZTgv0KYduLiVwHh3mMDuAjN7FlecAz35Xqdon3M6+GdiSVX
zXpT56s2NPYIDtCCcArJc0lyEYhrAIV5JPx19+LIBzNKIGihRfrgszI/0vUmwkK5hc
x7WQ==
X-Google-DKIM-Signature: v=1; a=rsa-sha256; c=relaxed/relaxed;
d=1e100.net; s=20161025;
h=x-gm-message-state:mime-version:in-reply-to:references:from:date
:message-id:subject:to;
bh=OR0JRqipyPqBbK3ui7wzjXy0TGz5LdUPrgVnh9W0wY8=;
b=jg9oH+wCTUytUEA7rnbVUGUgktLq66SIRw66NehdmfCARembnLIYdkfQjTrb7azeCu
DzCd77r1mVB4COX7FA7Y0Q1L10Gta3aVPX9aC48oJZ4xrcwKJNgfYPOJE13onUwCh
7D/9umpU+U1hffmBwzNYDc3nPJT5H0H2dps05WU9KF8576I3+DIFyA0Pa5RNduU1Y1JD

```

Figure 8. Email Header Display

In Figure 8 is an email header display that will be used in the analysis phase to make the acquisition of email.

### 3.3 Analysis

At this stage, perform an analysis of the acquisition process of the email, which generates the sender's IP address, recipient's IP address, sender's email address, email protocol, sender's email time, email time received, and email encryption obtained from email headers. This research object focuses on acquisition of IP address on the email. The results can be seen in Figure 9.



Figure 9. IP Address Sender Email



### 3.4 Reporting

At this stage, it is a digital forensic report from the email acquisition process. Email sent from someone via google mail has been found IP address of sender email in the email header, then IP address can be used as digital evidence.

### 4. Conclusion

From the research that has been done, the growth of information and communication technology is very fast. Email is one of the media used to exchange data information, images and others. As the rapid development of information and communication exchanges, causes cyber crime to flourish. So for the perpetrators of cyber crime or cybercrime required evidence. Crimes committed by cybercrime can be forensic on email. This research will do forensic on emails by way of acquisition of android based emails as digital evidence by using forensic methods of the National Institute of Standards and Technology (NIST). At the collection stage of evidence carried out on the smartphone Android lollipop 5.0.2 type Xiaomi Mi4i, to make an acquisition on Android-based email then the email must be opened using the browser. In this study using the original browser from android. In the testing phase, from a series of processes that have been done in obtaining the IP address of the sender in the email header, other than the sender's IP address is found also the recipient's IP address, sender's email address, email protocol, sender's email time, email time received and email encryption. In the final stages of the acquisition process in email successfully carried out by obtaining an IP address sends email in the header as digital evidence. In the next study can tracker the IP address of the sender of the email.

### References

- [1] Wearesocial, "Digital in 2018 : Global Overview," 2018.
- [2] Jakpat, "Which And Why: E-Mail Service and Web Browser of Choice," 2017.
- [3] J. Rose, "E-Mail Security Risks: Taking Hacks at the Attorney-Client Privilege," in Rutgers Computer & Tech. LJ, Vol. 23, 1997, Pp. 179.
- [4] M. N. Faiz, R. Umar, and A. Yudhana, "Analisis Live Forensics Untuk Perbandingan Keamanan Email Pada Sistem Operasi Proprietary," Jurnal Ilmiah ILKOM., Vol. 8, No. 3, Pp. 242–247, 2016.
- [5] D. Mualfah and I. Riadi, "Network Forensics For Detecting Flooding Attack On Web Server," (IJCSIS) International Journal of Computer Science and Information Security, VI. 15, No. 2, Pp. 326–331, 2017.
- [6] Agus Tri P.H, "Cybercrime Dalam Perspektif Hukum Pidana," Universitas Muhammadiyah Surakarta, 2010.
- [7] I. Riadi, R. Umar, and A. Firdonsyah, "Identification Of Digital Evidence On Android ' s Blackberry Messenger Using NIST Mobile," International Journal of Computer Science and Information Security (IJCSIS), Vol. 15, No. May, Pp. 1–7, 2017.
- [8] Y. Hoiriyah, H., Sugiantoro, B., Prayudi, "Investigasi Forensik Pada E-Mail Spoofing Menggunakan Metode Header Analysis," Jurnal Ilmiah DASI, Vol. 17, No. Desember, Pp. 20–25, 2016.
- [9] M. D. R. Wahyudi, "Deteksi e-mail Palsu dengan mempergunakan," Jurnal Teknologi, Vol. 1, Pp. 119–126, 2008.
- [10] Y. Zulfadhilah, M., Riadi, I., Prayudi, "Log Classification using K-Means Clustering for Identify Internet User Behaviors," International Journal of Computer Applications (IJCA), Vol. 154, No. 3, Pp. 34–39, 2016.
- [11] I. Riadi, J. E. Istiyanto, A. Ashari, and S. Subanar, "Internet Forensics Framework Based-on Clustering."
- [12] M. Agarwal and M. Gupta, "Systematic Digital Forensic Investigation Model," Journal of Computer, No. 5, Pp. 118–131, 2011.
- [13] R. Indonesia, "Undang-Undang Republik Indonesia Nomor 11 Tahun 2008 Tentang Informasi Dan Transaksi Elektronik. Departemen Komunikasi dan Informatika, Republik Indonesia", 2008.
- [14] M. N. Faiz, R. Umar, and A. Yudhana, "Implementasi Live Forensics untuk Perbandingan Browser pada Keamanan Email," JISKa, Vol. 1, No. February, Pp. 108–114, 2017.
- [15] G. M. Umar, R., Riadi, I., Zamroni, "A Comparative Study of Forensic Tools for WhatsApp Analysis using NIST Measurements," (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 8, No. 12, Pp. 69–75, 2017.

