The Use of Remote Access Tools by System Administrators Today and their Effectiveness: Case Study of Remote Desktop, Virtual Network Computing and Secure Android App

Article *in* International Journal of Computer Applications · February 2016

DOI: 10.5120/ijca2016908603

CITATION
1

READS
1,076

3 authors:

Ernest Domanaanmwi Ganaa
Jiangsu University
11 PUBLICATIONS **7** CITATIONS
SEE PROFILE

Timothy A. Abeo
TamaleTechnical University,Tamale, Ghana
16 PUBLICATIONS **14** CITATIONS
SEE PROFILE

Gerald Kpangkpari
CHRAG
2 PUBLICATIONS **1** CITATION
SEE PROFILE

The Use of Remote Access Tools by System Administrators Today and their Effectiveness: Case Study of Remote Desktop, Virtual Network Computing and Secure Android App

Ganaa D. Ernest
School of Applied Science & Technology
Dept. of ICT
Wa, Polytechnic
Wa, Ghana

Abeo Apasiba Timothy
School of Applied Science
Dept. of Computer Science
Tamale Polytechnic
Tamale, Ghana

Gerald Kpangkpari
Dept. of Computer Science
Kwame Nkrumah University of Science & Technology
Kumasi, Ghana

ABSTRACT
This study sought to find out how Network Administrators make use of remote access tools in their daily activities as Network Administrators. It also investigated how effective and reliable these tools have been to Network Administrators in terms of the tools' ability to return desired results to the users (Network Administrators).

From the findings of this research, 37.93% of the Network Administrators use remote access tools to do file transfer from one computer to the other, 26.44% use remote access tools to share or deploy applications on their local networks, 20.69% use remote access tools to access their terminal servers and 14.94% use remote access tools to create and set user privileges on their networks.

The investigation further revealed that 36.78% of Network Administrators agreed that remote desktop was effective, 24.14% also agreed that the secure android app was effective and 21.84% agreed that VNC was also effective.

General Terms
Remote Access Tools, Protocols, effectiveness, reliability.

Keywords
Remote Access; Tools; Protocols; Network Administrators; Effectiveness; Use;

1. INTRODUCTION
Remote access is the connection to a system from a secondary location other than that of the primary location of the system being accessed (Lahaie, 2013). This allows users to have access to a remote computer as though they were sitting directly behind that computer. This remote access to computers by users is possible because of remote access tools and by extension remote access protocols. These remote access protocols are technologies used to develop third party applications.

This study looks at the use of remote access tools by Network Administrators and how effective the uses of these tools are; with the Remote Desktop (RD), Virtual Network Computing (VNC) and a "Secure Android App" as case studies. Since remote access or remote connections to computers are done using remote access applications and each remote access application is based on an existing and or appropriate technology or technologies, this paper looks at how the Virtual Network Computing (VNC), the Remote Desktop (RD) and a "secure Android App" developed by Ganaa et al., (2015) are used by Network Administrators. The study further looked at how effective and reliable the uses of these tools are.

This study got responses from Network Administrators on how they use the VNC, the RD and the Secure Android App and by extension the RFB, the RDP and the secure RFB protocols respectively and how effective and reliable these tools are.

2. AIM AND OBJECTIVES OF THE RESEARCH
The aim of this study is to look at the use of remote access tools by Network Administrators while evaluating how effective and reliable these tools are to these Network Administrators.

The objectives of this study are:

- To discover the various uses of Remote Access tools by Network Administrators.
- To evaluate the effectiveness and reliability of Remote Access tools to Network Administrators.

3. REVIEW OF RELATED WORKS
Remote access allows users with remote computers to create a logical connection to an organization's network or the Internet (Microsoft Corporation, 2003).

Virtual Network Computing is a graphical desktop sharing system providing remote control via a computer network. It supports a controlling functionality by usage of a graphical screen update from a controlled device and capturing a mouse and or a keyboard (Patel & Somaiya, 2014).

VNC system is based on the RFB (Remote Frame Buffer) protocol to transmit all information between connected devices (Jadhav et al., 2012). VNC is a cross-platform application that can be used to take control of a remote computer over a network.

The RFB protocol is a simple protocol for sending graphics to be displayed on a remote screen. This protocol is a true thin client protocol because it has very low bandwidth requirements and shifts all processing demands to the RFB server instead of the RFB client (Kerai, 2010).The two remote

endpoints in the RFB protocol are referred to as the RFB client and the RFB server.

To be able to connect to a host computer and control the host from the client, VNC server must be running on the host computer and VNC viewer must also be running on the client computer. When VNC viewer accesses a host computer, the client computer's mouse and keyboard are shared with the host computer (VNC User Guide, 2012). When the host and client computers are connected, the user can print host files to a local printer, transfer files between them, copy and paste text between the client and host computer and even chat.

The VNC software is able to communicate with the remote system and can find out descriptions about the remote system and also have control on the peripheral devices from the cellular phones. Remote system administration tasks can also be performed from a cellular phone using VNC (Nandhini, 2013).

Remote Desktop (RD) is an application that works only over a TCP/IP network such as the Internet and allows a user to control the desktop and possibly takes control of the contents of one computer from the local one (Morris, 2008). Remote Desktop application provides features like file transfer and text chat. RD is a function which was included with Windows XP Professional to enable users to connect to other computers across the Internet from virtually any other computer. A user who has only one license for an application can make other users access it using remote desktop.

RDP is a proprietary protocol designed by Microsoft for remote input and display of host running the windows operating systems which is based on the Multipoint Application Sharing (T.128) recommendation by Telecommunication Union (Youming, 2013).

It is important to know that the computer the user will be connecting to remotely must have Microsoft Windows XP Professional, Windows Vista, Windows 7 or a later version of Windows Operating System. In the same way, the local computer the user will be using to do the remote connection must also have any of the above versions or a home version of Windows and both computers must be on a wired or a wireless network.

However, before a computer can be connected to using remote desktop technology, this involves configuring both the local computer controlling the connection and the target or remote computer to be accessed.

A secure RFB protocol is an RFB protocol with a self-signed Secure Socket Layer (SSL) certificate incorporated into it (Ganaa et al., 2015). Ganaa et al., (2015) in their paper did a comparative study of remote access technologies and also implemented a smartphone app based on a secure RFB protocol for remote system administration. In their paper, they identified some security lapses with the RFB protocol and in addressing these security lapses, incorporated a self-signed SSL certificate into the RFB protocol which is the technology their app was based on.

They argued that, this will ensure that secure encrypted connections were established between the smartphone and the server in order to fight Man-In-The-Middle (MITM) attacks which the RFB protocol was vulnerable to. A self-signed certificate is one that is signed by the individual who created it rather than a trusted Certificate Authority (Code Project, 2014).

The purpose of their system was to allow System Administrators monitor and administer their computer networks remotely using their android smartphones. With their system, a system administrator can create a user remotely, create, view and modify text files remotely, check network status, shutdown a server and set user privileges.

4. RESEARCH APPROACH

A research problem relates to a specific population and this population usually involves the total collection of all units of analysis about such a population which the researcher wishes to make explicit conclusions (Naidoo, 2011).

Since it is expensive and impractical to involve all members of the targeted population in a research study, researchers in all cases mostly rely on data obtained from a sample of the population.

The remote access tools considered in this paper were VNC, the RD and the secure android app developed by Ganaa et al., (2015). Administrators answered questionnaires based on how they use these three remote access tools and further rated how effective and reliable these tools are. In trying to know how effective and reliable these tools are, Network Administrators were required to evaluate each of these applications based on whether it gives the desired and consistent results.

4.1 Population And Sampling Techniques

The target population was Network Administrators and the sample size was 87 Network Administrator. The research made use of questionnaires and interviews in gathering the required data for the study. 87structured questionnaires were distributed to Network Administrators in order to get their candid and objective responses on how they use remote access tools and how effective and reliable these tools are to them.

This was followed up with face-to-face interviews in order to get extra information that they could not express through the questionnaire.

This data was coded and entered into SPSS and analyzed using the same SPSS. The analyzed data was interpreted and presented using appropriate diagrams and conclusions drawn from the analyzed data.

5. RESULTS AND DISCUSSIONS

From the survey conducted among the 87 Network Administrators, the study sought to know the various ways Network Administrators make use of remote access tools (VNC, RDP and the secure android app).

There were interesting findings as can be seen in table 1, 23 of the 87 respondents, representing 26.44% indicated that they use remote access tools to share applications on their local networks, 18 of the respondents, representing 20.69% also make use of remote access tools to access their terminal servers. Again, 13 of the 87 respondents, representing 14.94% indicated they use remote access software to create and set user privileges and 33 of the respondents, representing 37.93% also indicated they use remote access tools for file transfer.

Upon further verbal interaction with respondents, the following were revealed. Those administrators who use remote access tools to share applications on their network indicated that most at times their companies purchase software with a single user license and since their companies have more than one user, they have to share the software using remote access tools so that every employee will be able to use it. Then again, for creating and setting user privileges

using remote access tools, Network Administrators use remote access tools to add users to their network and use same to grant or deny access to some network resources and those who use remote access tools to transfer files do that by copying files from one computer to another through disk sharing.

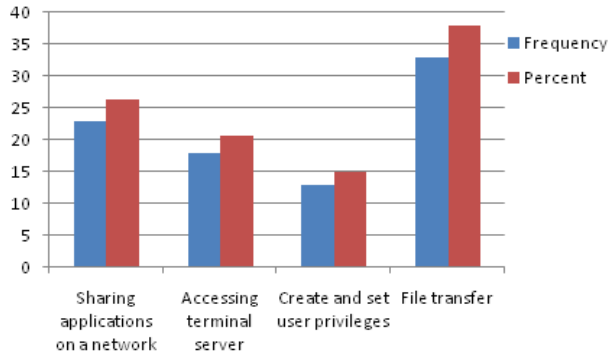

Figure 1: The various uses of remote access tools by Network Administrators. Source: field survey 2016

To determine the effectiveness and reliability of the remote access tools, Administrators were required to answer yes or no based on whether the remote access application they use gives the desired and consistent results when they are using it. 32 of the 87 respondents, representing 36.78% indicated that Remote Desktop (RD) was effective while 3 respondents representing 3.45% indicated that it was not effective.

Also, 19 of the 87 respondents, representing 21.84% indicated that Virtual Network Computing (VNC) was effective while 7 respondents representing 8.05% indicated otherwise.

On the other hand, 21 of the 87 respondents, representing 24.14% also alluded to the fact that the secure android app was effective while 5 respondents representing 5.75% were of the view that it was not effective as can be seen in Table 2 and Figure 2.

Table 2: Effectiveness of RD, VNC and secure Android App. Source: Field survey, 2016

	Yes	No	Percentage Yes	Percentage No
Effectiveness of RD	32	3	36.78%	3.45%
Effectiveness of VNC	19	7	21.84%	8.05%
Effectiveness of secure android app	21	5	24.14%	5.75%

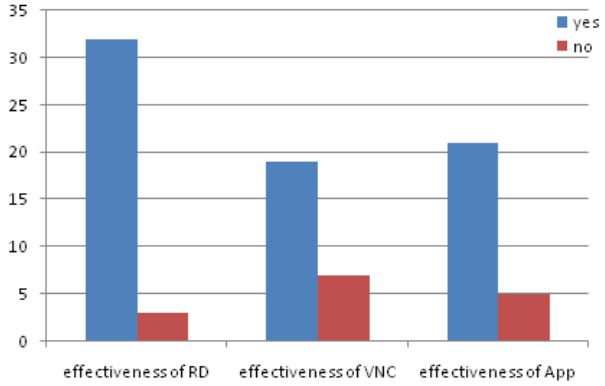

Figure 2: Effectiveness of RD, VNC and secure Android App. Source: Field survey, 2016

6. CONCLUSIONS AND RECOMMENDATION

From the findings of this study, it was discovered that, Network Administrators make use of remote access tools to share applications on local networks, access terminal servers, create and set user privileges and also for file transfer. The findings of the survey showed that the leading task Network Administrators use remote access tools to perform in Ghana is file transfer with application sharing on a local network being next to file transfer. Using remote access tools to share applications on a computer network will minimize the cost of purchasing software.

Also, for the effectiveness and reliability of the three remote access tools (Remote Desktop, Virtual Network Computing and the secure Android App) used as case study for this research, it will be concluded from the findings of this research that remote desktop is the most effective, most reliable, followed by the secure Android App with the VNC being the least effective. According to Masthan et al., (2013), applications of VNC which are based on RFB protocol are generally slower, offer fewer features and security options than those based on RDP protocol, together with the above conclusion further confirms that the RDP protocol is a better protocol than the RFB protocol since both VNC and the secure android app are based on the RFB protocol with the remote desktop being on the RDP protocol. However, it is worth noting that the two protocols, that is the RDP and the RFB protocols were developed to serve different purposes.

It is recommended that further research should be done to find out whether network administrators could use alternative tools which are not remote access tools to carry out these same tasks performed with remote access tools.

7. REFERENCES

[1] Code Project (2014) Android Security-Implementation of Self-Signed SSL Certificate foryour App. Retrieved from:www.codeproject.com/articles/826045/androidsecurity-implementation-of-self-signed-SSL

[2] Ganaa D. E, Twum F. &Hayfron-Acquah J. B. (2015) A Comparative Study of Remote Access Technologies and Implementation of a Smartphone App for Remote System Administration Based on a Secure RFB Protocol. International Journal of Science and Engineering Applications. Volume 4, Issue 4. pp. 167

[3] Jadhav A , Oswal V, Madane3 ,Harshal S. Z & Hatmode V. (2012) VNC Architecture Based Remote

Desktop Access Through Android Mobile Phones. International Journal of Advanced Research in Computer and Communication Engineering. Volume 1, Issue 2. pp 98

[4] Kerai P. (2010) Tracing VNC and RDP Protocol Artefacts on Windows Mobile and Windows Smartphone for Forensic Purpose. In Proceedings of International Cyber Resilience Conference. Australia. pp. 58. Retrieved from: http://ro.ecu.edu.au/icr/7

[5] Lahaie C. (2013) TeamViewer Forensics. pp. 3. Retrieved from: www.champlain.edu/Documents/LCDI/.../Team-Viewer-Forensics.pdf.

[6] Masthan K, Kumar S. K. & Prasad H. V. (2013) Virtual Network Computing of User Appliances. International Journal of Computer Science and Mobile Computing. Volume 2, Issue 8. pp. 132.

[7] Microsoft Corporation (2003) Windows Server 2003 Remote Access Overview. pp. 1. Retrieved from: http://www.vancouver-network-support.com/support-files/remoteaccess.pdf

[8] Morris V. (2008) Remote Desktop Tutorial. pp. 2. Retrieved from: www.ginnymorris.com.

[9] Naidoo P. (2011) Intercultural Communication: A Comparative Study of Japanese and South African Work Practice. PhD Thesis, University of Zululand-South Africa. pp. 113. Retrieved from : http://uzspace.uzulu.ac.za/bitstream/handle/10530/593/PHD%20Thesis%202011_Paulene%20Naidoo.pdf?sequence=1

[10] Nandhini S, Archana.N, Bagavathi.S, Arunachalam.M (2013) Virtual Network Computing Viewer Using Remote Frame Buffer Protocol. International Journal of Engineering and Innovative Technology. Volume 2, Issue 8. pp 191.

[11] Patel S. V & Somaiya R. D. (2014) Mobile Virtual Network Computing System. International Journal of Innovative Research in Computer and Communication Engineering. Volume 2, Issue 3. pp 3596.

[12] VNC User Guide (2012) Version 5.0. pp 49. Retrieved from: https://www.realvnc.com/products/vnc/documentation/5.0/guides/user/VNC_User_Guide.pdf.

[13] Youming L. (2013) Virtual Networking for Mobile Cloud Computing. Master's Thesis, Aalto University-Finland. pp. 19. Retrieved from: https://into.aalto.fi/download/attachment/.../Lin_Youming_thesis.pdf?