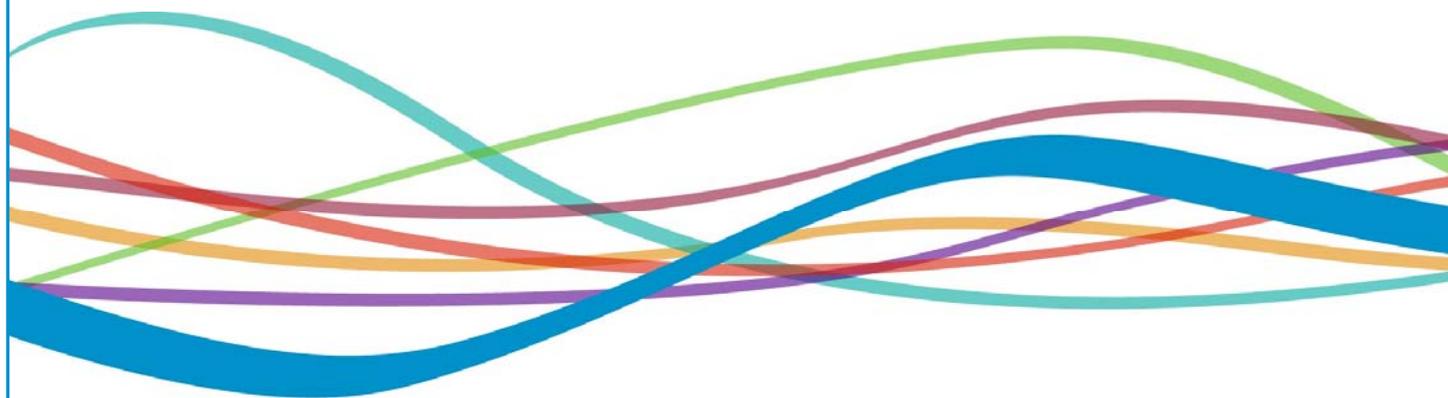


Evaluation report

MedStamp Communicator secure data transmission solution

CEP 07007

November 2007



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The product

MedStamp Communicator secure data transmission solution, software version 3.311, supplied by MedStamp Ltd.

Field of use

The MedStamp Communicator software is designed to transfer securely (and with an audit trail) all data types, with specific features for Digital Imaging and Communications in Medicine (DICOM) image data. The MedStamp Communicator transmits DICOM images securely both within and between organisations, including remote sites, using the existing Internet infrastructure. The software runs on individual client machines, communicating with MedStamp's server, which acts as a gateway for users to log onto the system.

Increasing radiologist access to diagnostic images may contribute to the successful delivery of the NHS '18 week wait' target by the end of 2008. The Medstamp Communicator could be used as part of a teleradiology system to transmit diagnostic images for remote reporting.

National guidance

The Standards Enforcement in Procurement (STEP) process was developed to ensure that IT systems with the National Health Service in the United Kingdom conform to agreed standards. The process details the standards with which suppliers have to conform and provides supporting guidance. Suppliers of IT systems must complete a STEP questionnaire. Responses from the STEP questionnaire will form part of the procurement contract. Systems implemented within the NHS should be e-GIF compliant. The e-GIF recommends Advanced Encryption Standard, Triple Data Encryption Standard (3DES), or Blowfish for encryption.

NHS Connecting for Health (CfH) is tasked with delivering the National Programme for IT (NPfIT), which is intended to create a coherent IT infrastructure across the NHS. This infrastructure will include picture archiving and communications systems (PACS). The NPfIT is being delivered throughout England within five regions, each working with a single local service provider (LSP). CfH advise that any application software procured for use in an LSP NPfIT environment would need to meet not only the CfH Information Governance (IG) requirements, but any other relevant requirements and standards (eg N3 connectivity requirements) that CfH or the LSP might impose. As of 1st April 2007, accountability for the delivery of the NPfIT has been transferred to Strategic Health Authorities (SHAs) as part of the NPfIT Local Ownership Programme (NLOP). It is strongly recommended that you seek advice from your local SHA / NPfIT regarding procurement of IT software and connectivity to LSP delivered PACS.

Evaluation method

The MedStamp Communicator software was installed on a number of laptop computers at the evaluation site (PACSnet) and access to the internet was via a high-speed (100Mbps) N3 (NHS network) link. The images were also sent over the internet to a home user via an asymmetrical digital subscriber line (ADSL), with a download speed of 8 Mbps and

contention ratio of 50:1. The laptops were configured to automatically detect network settings; each had 1GB of random access memory (RAM) and Windows XP Professional (Service Pack 2) installed. User accounts were created by an administrator on the MedStamp server. Technical performance of the following features were assessed: installation of the software, sending and receiving DICOM images of varying file sizes, review of the MedStamp server log as a means of establishing an audit trail, data integrity and authenticity, plus any constraints or issues arising with the system. Help documentation and support, operational and economic considerations were also addressed.

CEP verdict

Installation of the MedStamp Communicator software (onto PCs meeting the required minimum specifications) was quick and easy. The software detected network settings automatically, so no further configuration was required.

The time taken to send images over the N3 network link varied according to the file size. A 40 MB scanned DICOM chest x-ray image took 1 minute 6 seconds to arrive on the server. This time included the preparation of the file for transmission, compression, and encryption. Smaller studies were sent virtually instantly: a study with a 7.3 MB chest X-ray DICOM image was sent in less than 2 seconds. A total of nine studies (with over 800 DICOM images) were bundled to produce a package of nearly 0.5 GB. The studies were sent to two users at the same time and the whole process (file preparation, encryption, compression, transmission) took 29 minutes. Preparation of the files took 5 minutes, compression 7 minutes, encryption 1 minute, and transmission 16 minutes. When the package was sent to only one recipient, the whole process took 24 minutes. No tests were attempted in sending images over the ADSL home user network link, as the upload speed was limited to a maximum of 256 Kbps.

In receiving images over the N3 network link, the 0.5 GB file package above took 13 minutes to download, 1 minute to decrypt and a further 1 minute to decompress. In receiving images over the ADSL home user network link, the same 0.5 GB file package took 16 minutes to download, 1 minute to decrypt and a further 1 minute to decompress.

For auditing purposes, the MedStamp Communicator server maintains a log of all transactions performed by users. These details can be exported to a spreadsheet software package for analysis. Throughout the evaluation, the integrity of the images was maintained during the transfer process.

The help menu is very limited and there was no online help available at the time of evaluation. The Quick Start Guide and User Guide were judged to be clear and well written documents with good illustrations. Technical support was provided via email; response times were good and most replies were received the same day. Telephone support is also available.

The use of the internet as the underlying network infrastructure makes MedStamp Communicator attractive to organisations which have good internet links as an alternative solution to the complexities of implementing a virtual private network (VPN) for secure data transmission.

This report describes the evaluation of the MedStamp Communicator version 3.311 data transmission solution supplied by MedStamp Ltd. The software is designed to transfer securely and with an audit trail all data types, with specific features for DICOM image data. Users of MedStamp Communicator are able to transmit DICOM images securely by using the internet as the underlying network infrastructure (for example, over existing ADSL without the need for virtual private networks).

The system employs a lossless compression technique to compress images to around a third of the original size, thus increasing transmission speed. Data security is handled by using the Blowfish^[1] fast encryption algorithm. Blowfish is unpatented, royalty free and no license is required for its use. Blowfish is one of the encryption algorithms specified in the e-Government Interoperability Framework (e-GIF) Technical Standards catalogue version 6.2^[3]. e-GIF standards are mandatory for all government agencies, including NHS organisations, involved in the exchange of information.

NHS security standards

The Standards Enforcement in Procurement (STEP) process was developed to ensure that IT systems with the National Health Services in the United Kingdom conform to agreed standards. The process details the standards with which suppliers have to conform and provides supporting guidance^[4]. Suppliers of IT systems must complete a STEP questionnaire. Responses from the STEP questionnaire will form part of the procurement contract.

Systems implemented within the NHS should be e-GIF compliant. The e-GIF recommends Advanced Encryption Standard, Triple Data Encryption Standard (3DES), or Blowfish for encryption^[5].

NHS Connecting for Health (CfH) is tasked with delivering the National Programme for IT (NPfIT), which is intended to create a coherent IT infrastructure across the NHS. This infrastructure will include picture archiving and communications systems (PACS). The NPfIT is being delivered throughout England within five regions, each working with a single local service provider (LSP). CfH advise that any application software procured for use in an LSP NPfIT environment would need to meet not only the CfH Information Governance (IG) requirements, but any other relevant requirements and standards (e.g. N3 connectivity requirements) that CfH or the LSP might impose.

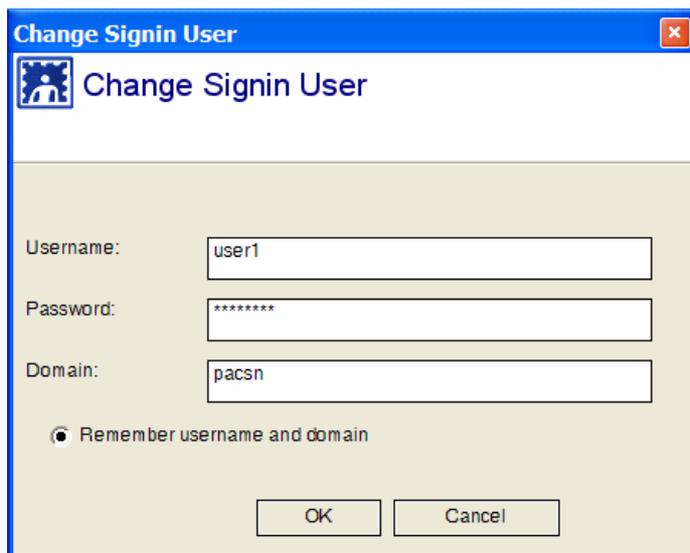
General description

MedStamp Communicator software was designed to transfer DICOM images securely, both within and between organisations including remote sites, using the existing Internet infrastructure. The software runs on individual client machines, communicating with MedStamp's server, which acts as a gateway for users to log onto the system.

The system employs a lossless compression technique to compress images to around a third of the original size, thus increasing transmission speed. Data security is handled using the Blowfish^[1] open source fast encryption algorithm.

A user account is required in order to use MedStamp Communicator to send and receive images. This is created by MedStamp's server administrator. To log on, the user must provide a username, password and domain (figure 1).

Figure 1. Login screen



The MedStamp server operates in a similar manner to a standard e-mail server, receiving images from the sender and storing them for subsequent download by the recipient. At logon a connection is established between the client PC and the server using transmission control protocol (TCP). Before transmission a DICOM image or a study with images is compressed, and encrypted into a 'package'. The package is transmitted as a number of smaller data parts by using a custom binary protocol. If the network does not support the custom binary protocol the hypertext transfer protocol (HTTP) is used instead. The advantage of using the custom binary protocol is that it is much faster than HTTP.

Once logged onto MedStamp Communicator, the recipient is notified that there is a package to download. The notification appears in MedStamp Communicator as a pop-up box with a message. The stored package is then downloaded onto the recipient's PC automatically. The recipient can prevent downloading by deleting the package before the download has completed. Once a package is deleted during download there will be no copy of the package

on the MedStamp server. Packages are held on the server for 2 weeks from the date they were sent before they expire. The package is automatically deleted if the 2 week period expires. When the recipient of the package logs on MedStamp Communicator a message will appear in the Packages Tab informing the recipient that a package sent was deleted because it had exceeded the expiry period. The recipient can request the sender to send another package either by telephone or email. There is no built in functionality within the software to ask the sender to resend the package. The default expiry period can be changed by the MedStamp server administrator at no additional cost. Packages do not remain on the server indefinitely as the server is used for transmission only, and not for storage.

When a package has been received, decrypted and decompressed it is saved to a folder on the recipient's PC called Root. The images can either be viewed from this folder by using a DICOM viewer or they can be imported into a PACS.

The server maintains a detailed log of all packages sent or received, which can be examined using a standard spreadsheet software package. By clicking the report button in the Packages tab a user can view a report of the all images sent or received.

Software requirements

Table 1 Software requirements

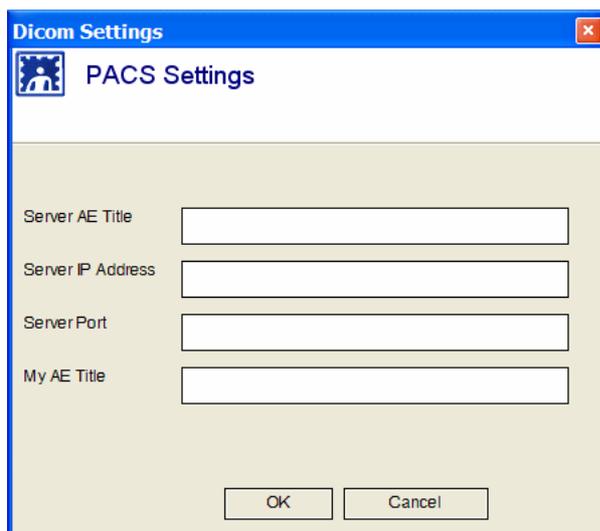
Hardware System Requirements	Minimum Specified	Tested by PACSnet
CPU	No details given	Pentium ® 2GHz
Memory	512	1GB
Hard disk space	5-10 GB	37.2 GB (test computer 1) 40 GB (test computer 2) 250GB (test computer 2)
Operating system	Windows 98 Windows 2000 Professional Windows XP Windows XP professional	Windows 2000 Professional Service Pack 4 Windows XP with Service Pack 1 Windows XP Professional Service Pack 2
Internet access	512Kbps	Hospital link to the internet was used Details of connection speeds not available Broadband 8Mbps download with 50:1 contention ratio

Installation

The installation executable file (approximately 7MB) can be downloaded from the MedStamp website. Registration is not required. The installer must have administrative privileges over the client PC. A 15.2MB 'MedStamp Communicator' directory is created under 'Program Files' in Windows XP Professional.

The default parameters for connecting with the MedStamp are as follows. The server address is configured with www.medstamp.net and the server port number has a default value of 8080. The software can be configured to link to a picture archiving communication system (PACS) by completing the 'Server AE Title', 'Server IP address', 'Server Port' and 'MyAETitle' (figure 2). The software can be configured to start automatically when the PC is switched on, or manually.

Figure 2. PACS settings



The image shows a Windows-style dialog box titled 'Dicom Settings' with a sub-tab 'PACS Settings'. It features four text input fields for configuration: 'Server AE Title', 'Server IP Address', 'Server Port', and 'My AE Title'. At the bottom of the dialog, there are two buttons: 'OK' and 'Cancel'.

During installation six items are installed in the 'Start\Programs\MedStamp Communicator' menu:

- MedStamp Communicator
 - MedStamp Home
 - MedStamp Terms of Service
 - Uninstall MedStamp
 - Quick Start Guide
 - User Guide.

The two guides on how to use MedStamp Communicator software are installed as PDF files. Uninstalling the software is also a relatively easy task. This can be achieved by using the uninstall option mentioned above or the 'Add or Remove Programs' icon in the Control Panel.

During the removal of MedStamp Communicator, no data from the previous installation will be saved if the 'Delete database' option is selected. This is the best choice if there are problems with the software and a clean installation is required. Deleting the database does not result in the removal of any images saved to the hard drive.

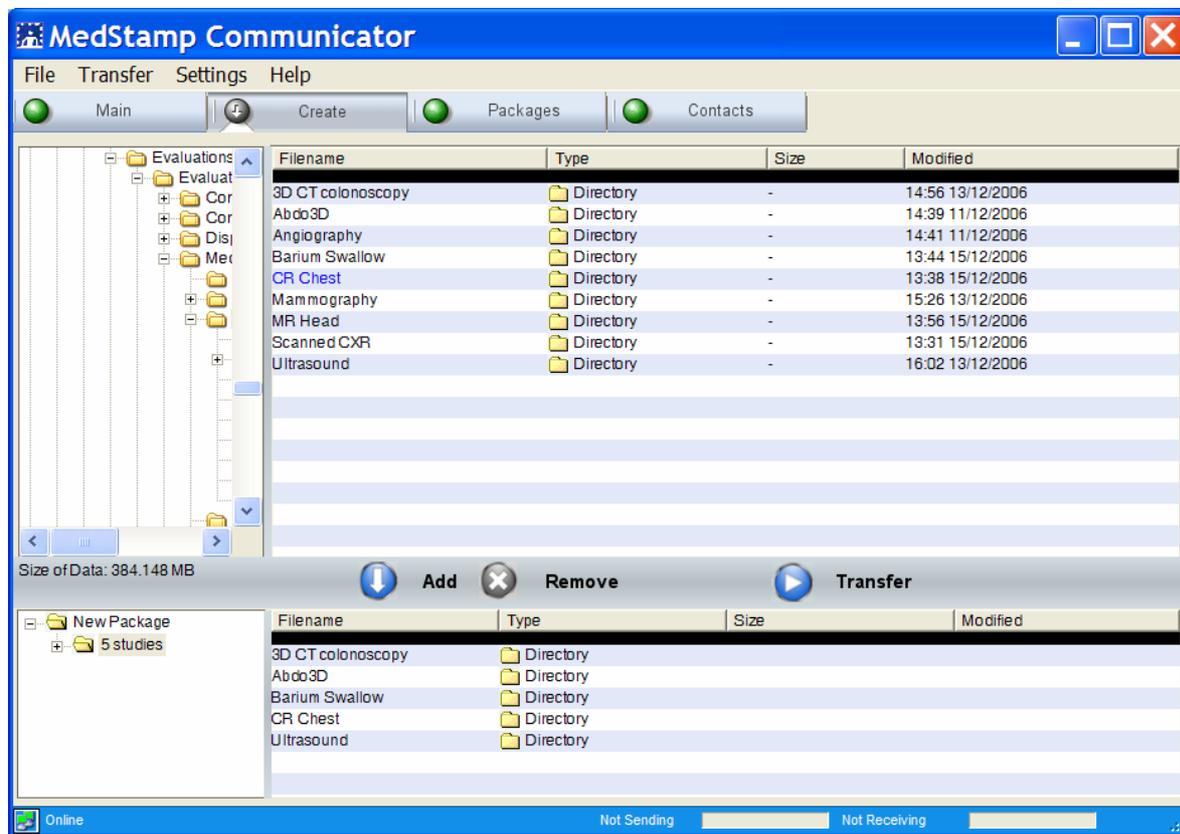
The software requires an internet connection to communicate with the MedStamp server. MedStamp recommends an internet link with a minimum download speed of 512Kbps. Users should be aware that the download and upload speeds of ADSL are not the same so sending images will take longer than receiving if this type of connection is utilised.

MedStamp Communicator user interface

As shown in Figure 3 there are only four buttons a user can click to navigate through the MedStamp Communicator user interface. The MedStamp Communicator graphical user interface is well laid out and is easy to navigate.

Using MedStamp Communicator does not require a steep learning curve. A user can use the file menu to access the software's functions but most of MedStamp Communicator functions can be accessed by using the four tab buttons. The Main button is used for logging on to the MedStamp Communicator client interface. Once logged on a user can quickly send DICOM images using the functions found on the Main tab. The Create button is for preparing DICOM images into packages for transmission. Users can transmit images from a PACS or select them from a specified location such as a local hard drive on a computer, network storage and other devices used for storing DICOM images. The Contacts tab lists those who can receive DICOM images from the user.

Figure 3. MedStamp Communicator interface

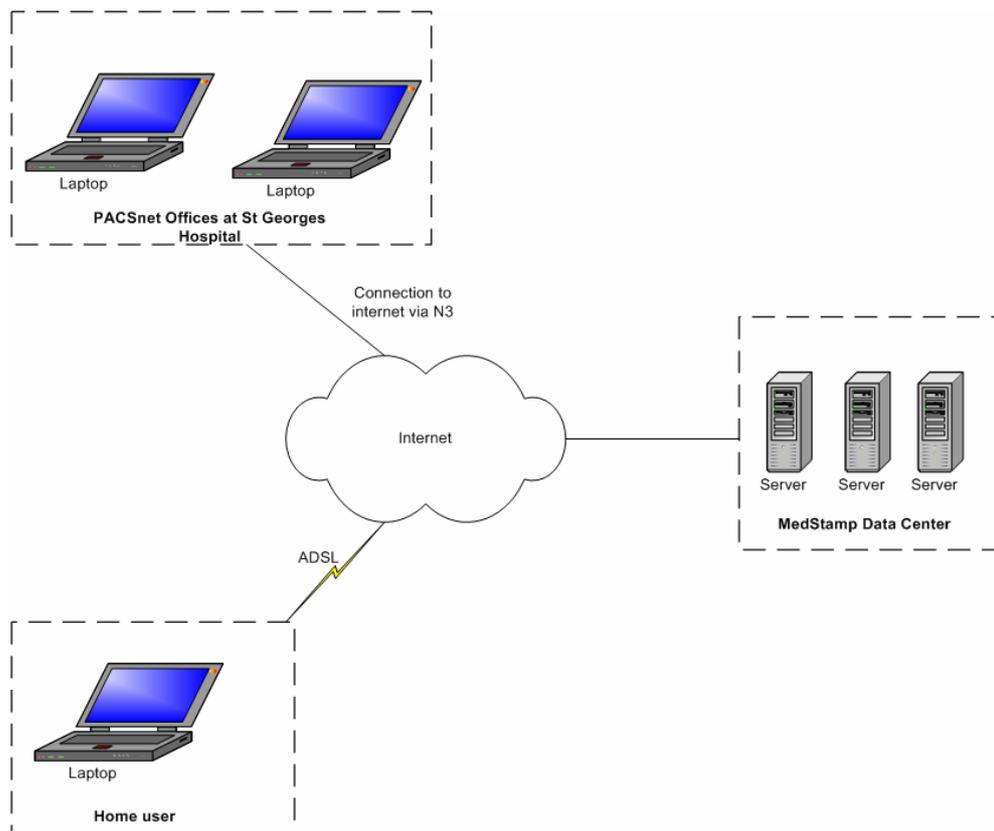


Equipment / network setup

The software was installed on a number of computers at PACSnet and access to the internet was via a 100 Mbps N3 link. The images were also sent to a recipient who was using asymmetrical digital subscriber line (ADSL) with a download speed of 8 Mbps and contention ratio of 50:1.

The network configuration setup in figure 4 was used to perform the evaluation. All laptops used had MedStamp Communicator software installed. The laptops were configured to auto detect network settings, each had 1GB of RAM and Windows XP Professional installed. User accounts were created by an administrator on the MedStamp server.

Figure 4. MedStamp Communicator connection setup



Installation

Installation onto a PC running Windows 2000 Professional (Service Pack 4) was quick and easy. Configuration was not necessary as the software detected network settings automatically. However, dynamic link library errors occurred when attempting to install to a PC running Windows XP Professional. Further investigation revealed that this PC had no Service Pack 2 installed. Once the machine was updated with latest Service Pack the installation went smoothly. The Quick Start Guide and the User Guide do not specify with which service packs the software is compatible with.

Sending images using N3 link

A number of tests were conducted during the evaluation of the software. DICOM images of different sizes were used in the evaluation. A 40 MB scanned DICOM chest x-ray image took 1 minute 6 seconds to arrive on the server. This time included the preparation of the file for transmission, compression, and encryption.

An attempt was made to transmit a study with no DICOM images (zero file size). This was performed to detect whether the system would be able pick up errors and what error messages it would display. MedStamp Communicator identified the error and displayed a message box (figure 5) asking the user to select at least 1 DICOM image to include in the study.

Figure 5: Encryption of a zero file



In the evaluation it was observed that smaller studies were sent virtually instantly. For example a study with a 7.3 MB chest x-ray DICOM image was compressed, encrypted and transmitted in less than 2 seconds.

A total of nine studies (with over 800 DICOM images) were bundled to produce a package of nearly 0.5 GB. The studies were sent to two users at the same time and the whole process (file preparation, encryption, compression, transmission) took 29 minutes. Preparation of the files took 5 minutes, compression 7 minutes, encryption 1 minute, and transmission 16 minutes. When the package was sent to only one recipient the whole process took 24 minutes.

Receiving images using N3 link

A package with over 800 DICOM images (approximately 0.5 GB) took 13 minutes to download, 1 minute to decrypt and a further 1 minute to decompress. MedStamp uses the term 'extraction' to refer to the combined decryption and decompression of the package.

The user receiving the images can view the full MedStamp Communicator report once extraction has been completed. The report will have details of the package such as the package identification number, the recipient name, the sender's name, the number of parts the package was broken down to during transmission, the time the package was sent, and a list of all the files sent.

Receiving images using ADSL

During the evaluation the ADSL home user computer was only used to receive images. No tests on sending images were conducted as the upload speed for the ADSL link was limited to a maximum of 256 Kbps. Receiving a 40MB scanned chest x-ray image took less than a minute. A 0.5GB package with 800 DICOM images took about 16 minutes to download, 1 minute to decrypt and another minute to decompress.

Figure 6 Report from MedStamp Communicator

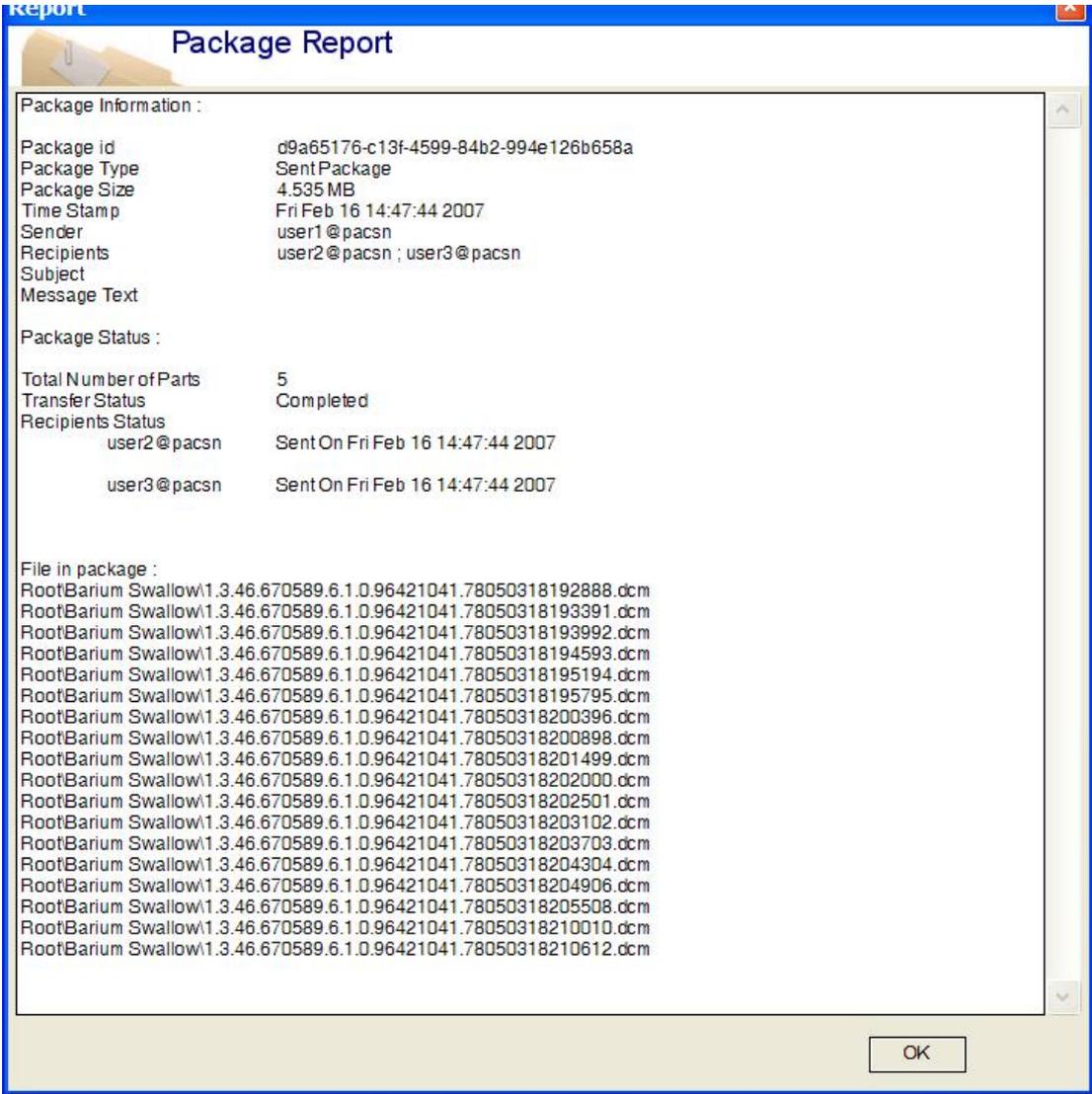
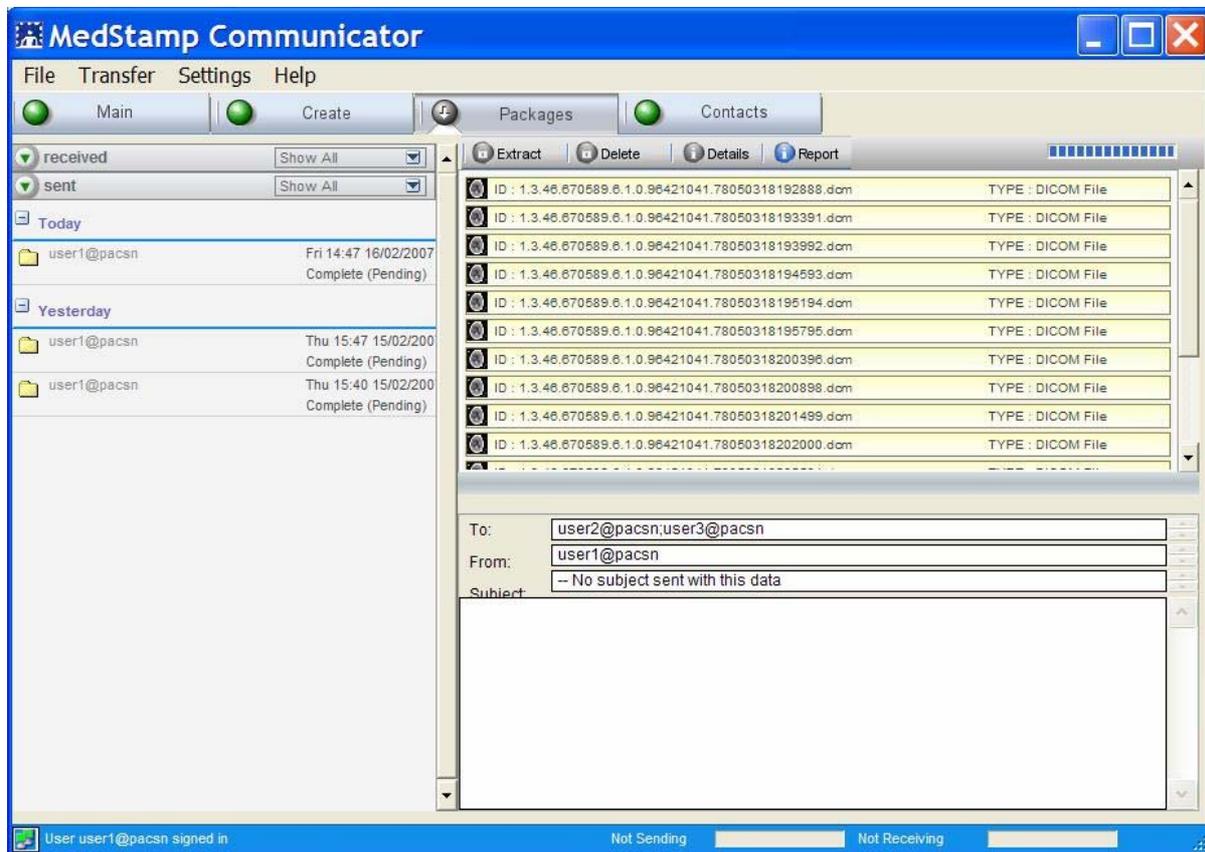


Figure 7. Sending and receiving packages tab



Using the packages tab a user can view the history of what packages have been sent and received. A user can also view the status of the packages sent or received. In figure 7 the sent packages are shown as Complete and Pending and this tells the user that the recipients have not downloaded the packages sent to them from the MedStamp Data Centre. Packages can be extracted and deleted on this tab.

MedStamp server log

For auditing purposes the server maintains a log of all the transactions performed by users when using MedStamp Communicator. These details can be exported to a spreadsheet software package for analysis. Logged data include package id, time sent, time received by the server, time downloading was initiated, time downloading was completed, package subject, sender and receiver IP addresses, package size, package expiry date. Table 2 shows sample log data.

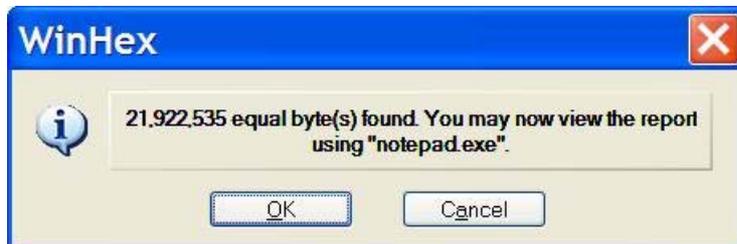
Table 2. Server log data

package id	time_send_start	time_send_complete	time_receive_start	time_receive_complete
61f177c9-e26d-4a9a-b358-da6655ca7926	15/12/06 16:38	15/12/06 16:38	15/12/06 16:44	15/12/06 16:45
f8bab4eb-aac7-4265-9224-94032bacf46a	15/12/06 17:06	15/12/06 17:14	20/12/06 10:34	20/12/06 10:41
e4a56cca-8e8f-4076-b4de-852a637b5222	04/01/07 15:41	04/01/07 15:41	04/01/07 15:41	04/01/07 16:22
55946e92-2b16-41d9-bae7-62c85f03eee6	09/01/07 15:14	09/01/07 15:24	11/01/07 15:13	11/01/07 15:23
8b4c8115-db7e-4c5c-a28a-b2bd1b2062b4	09/01/07 15:15	09/01/07 15:35	11/01/07 15:13	22/01/07 12:05
8f6bb0e2-3afb-47a0-a04d-e2b88fe5e01b	11/01/07 11:42		11/01/07 11:42	
6aef4d61-124b-4a8c-8004-19d9e1da08fd	11/01/07 13:02		11/01/07 14:01	
1ea27ba3-7a3c-4dcb-96be-a61c438a12d0	11/01/07 13:32		11/01/07 14:01	
ae3f3925-8a20-46a3-af37-26295b7ba60a	11/01/07 13:54	11/01/07 13:58	11/01/07 14:01	11/01/07 14:08
6f14891b-5712-4f3d-80d4-ee6dbdd620d8	11/01/07 15:18		11/01/07 15:18	
e5d217d0-651c-402e-ac16-35d581ede880	11/01/07 16:02		22/01/07 12:08	
98121e55-9a52-452a-875f-1d1e2ec16687	23/01/07 15:49	23/01/07 15:49	23/01/07 15:51	23/01/07 15:51
b42910de-db6e-4499-8cdb-a3cb62f2c44d	23/01/07 15:55	23/01/07 15:55	23/01/07 16:39	23/01/07 16:42
de36e1e1-3bda-4b0c-af99-988d8741e15f	29/01/07 10:04	29/01/07 10:05	30/01/07 10:51	30/01/07 11:02
3a508102-30a3-4936-83e5-4cc902342fef	29/01/07 15:15	29/01/07 15:28	30/01/07 10:51	06/02/07 10:49
25ef2919-0ce2-412f-8db7-4ae33d66eb69	29/01/07 16:23	29/01/07 16:29	30/01/07 10:59	30/01/07 11:23
d266a068-55d8-4142-a4d7-5e82469fba90	30/01/07 16:32	30/01/07 16:43	01/02/07 09:54	01/02/07 10:07
0c3a1a95-c2c4-485d-80a6-5cdbd14d3a25	08/02/07 11:59	08/02/07 12:10	08/02/07 18:08	08/02/07 18:23

Data integrity and authenticity

The integrity of the images was maintained during the transfer process. A comparison of the DICOM images before and after transmission was performed. Checksums were also computed for the before and after but no changes were observed. There was no difference in the computed checksums before the images were transmitted and after they were received.

Figure 8. Byte for byte comparison of images before and after transmission



Checksums were also computed before and after transmission the images were transmitted but no changes were observed. The checksum for the scanned chest x-ray image is shown in figure 9.

Figure 9. Verifying image integrity before and after transmission



If the images are anonymised using the MedStamp anonymisation tool the checksum for before and after transmission will give different values. This is attributed to the fact whenever anonymisation is performed on DICOM images by any software program, any information that identifies a patient is discarded. Tests on anonymisation were not performed during the evaluation.

Constraints

When sending images users can send the images immediately or they can choose a later time. When using the Send Later option it is not possible to delay sending a package before a time earlier than 6.00 pm. The system is designed to only send a package after 6.00 pm. A user can only select the times specified in the drop down menu and cannot manually key in any other choice.

When the software is sending a large number of DICOM images, after compression and encryption the program appears as if it has frozen when sending is in progress. This can be a little confusing to new users.

Issues arising

During the evaluation there were instances where recipients were unable to download packages from the server. Some of them expired and had to be deleted from the MedStamp server. This problem was highlighted to the MedStamp Technical team and as a result a new version of the software was released which seemed to have solved the problem.

Help documentation and support

There is a help menu which can be found when using MedStamp Communicator. The help menu is very limited, particularly as there was no online help available at the time of evaluation. Using the help menu a user can link to the MedStamp website for frequently asked questions (FAQ). Clicking on this link directed the user to a MedStamp blank web page.

Documentation is provided as a 'Quick Start Guide' and 'User Guide'. Both guides are installed as PDF files during the installation process when setting up MedStamp Communicator. The guides can be accessed by clicking on 'Start\Programs\MedStamp Communicator' menu on the desktop.

The Quick Start Guide is a concise three page document covering the MedStamp Communicator product. It is a clear and well written document with good illustrations. By reading the document users will be able install, register and use MedStamp Communicator to transfer DICOM images securely in a short time. The only detail missing in the Quick Start Guide are the system requirements which might be useful for the installation of MedStamp Communicator.

The User Guide is a thirty page document which has more detail than the Quick Start Guide. This first thing a user notices when accessing this document is that it opens with text rotated 90 degrees anticlockwise and this has to be rotated clockwise every time a user logs on to use MedStamp Communicator. Again the user guide is well written, quite easy to follow and has some excellent illustrations.

During the evaluation of MedStamp Communicator technical support was provided via email. Telephone support was also available but the need for this was minimal as the email support provided most of the answers to the problems raised. Response times were good and most replies were received the same day.

Clinical impact

The 18 week pathway is an initiative for the NHS that a patient should wait no more than 18 weeks from the time a GP referral is made to the start of the hospital treatment. This NHS target has to be achieved by December 2008.

Increasing the performance of access to diagnostic imaging can be a major contributing factor in the delivery of the 18 week target. Once imaging has been completed the images have to be stored and distributed electronically, and interpreted by healthcare professionals such as radiologists. Medstamp Communicator could therefore be used as part of a teleradiology system to transmit diagnostic images.

The use of the internet as the underlying network infrastructure makes MedStamp Communicator more attractive to organisations which have good internet links. The benefit of using this solution is that healthcare professionals have the capability to send and receive DICOM images securely from anywhere, provided MedStamp Communicator is installed on the computer in use and a connection to the internet is available.

Alternative technologies

Virtual private networks are used by some organisations to transfer images securely. MedStamp Communicator offers an alternative solution which does not come with the complexities of implementing a VPN. Both MedStamp Communicator and virtual private networks use the internet as the underlying network infrastructure.

Costs and licensing

Customers have two options when buying MedStamp security solution. With option 1, MedStamp will manage the MedStamp Server, user accounts, reports and alerts. The server will be located at a server farm in the Docklands area of London. Physical access to the server is limited to selected MedStamp staff. In the second option, the Medstamp server is located at a customer's premises. All administration tasks are carried out by the customer. MedStamp will provide training and support when required.

For option 1 above, the cost of MedStamp Communicator is covered by an annual subscription of approximately £600 per user. This cost includes 24 hour/7 days a week support, free software upgrades and future additional utilities released by MedStamp Ltd. The license cost will include the management of the servers by MedStamp Ltd. In addition the company can help in identifying network problems if a user is experiencing connectivity issues when using the software.

As of 1st April 2007, accountability for the delivery of the CfH NPfIT has been transferred to Strategic Health Authorities (SHAs) as part of the NPfIT Local Ownership Programme (NLOP). It is strongly recommended that you seek advice from your local SHA / NPfIT regarding procurement of IT software and connectivity to LSP delivered PACS. LSPs have contractual obligations concerning the security and up-time of the systems they manage, and will wish to be reassured that add-in products do not compromise the integrity of the system.

NHS trusts wishing to purchase MedStamp Communicator are advised to liaise with their local IT department and PACS manager to discuss their purchasing requirements.

Algorithm: A well defined step by step process of how to solve a problem and can be written in natural language. In computing once an algorithm has been defined it can be written in any programming language.

Blowfish: An encryption algorithm invented by Bruce Schneier, an American cryptographer, and specialist in computer security. Blowfish is not patented and can be used free by anyone without obtaining a license.

Checksum: A computed value performed on the contents of a file to verify data authenticity. A file that has the same checksum value before and after transmission means that there is a high chance that no errors occurred during transmission.

Compression: The process whereby data are reduced in size to save space or to speed transmission.

Contention ratio: Contention is when the bandwidth available is shared by a number of broadband subscribers. A contention ratio of 50:1 means a broadband subscriber will be sharing the bandwidth with forty nine other subscribers.

DICOM (Digital Imaging and Communications in Medicine): The American College of Radiology, National Electrical Manufacturers Association (ACR-NEMA) standard protocol adopted by all manufacturers of equipment associated with medical imaging. The standard provides a method of linking a series of heterogeneous modalities, workstations and printers without the need for customised hardware to allow them to communicate and transfer images

Encryption: The process of changing information into secret code so that it is undecipherable except by those authorised to view it.

Hypertext transfer protocol (HTTP): A protocol used by web browsers to exchange files over the internet.

N3 (New National Network): This is a Multiprotocol Label Switching (MPLS) network implemented by British Telecom (BT) for the NHS and it replaced the NHSnet. The N3 has over 18000 broadband connections and is used to connect services such as electronic patient records and picture archiving communications system.

RAM: An acronym for random access memory. RAM is a type of data storage in a computer which allows the data to be accessed in any order, unlike some other types of storage such as magnetic tape which require the data to be read in sequence.

Transmission Control Protocol (TCP): Part of the internet protocol suite (TCP/IP) used in computer communication networks. TCP enables two hosts to establish a connection and exchange streams of data. TCP guarantees delivery of data and also guarantees that packets will be delivered in the same order as they were sent.

PACSnet would like to thank the assistance of MedStamp Ltd particularly Philip Swan and Tom Bowles.

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<http://www.medstamp.com>

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MedStamp Communicator 3.5

Since the evaluation of MedStamp Communicator 3.311, MedStamp Limited have released version. 3.5.

According to MedStamp Limited compression and encryption is four times faster with the new version.

It features central anonymisation of image data. An administrator can set and enforce the DICOM tags to be removed from each package

There is an enhanced administrator interface which allows easier user account administration.

A new feature for automatic updates is now available. This feature allows updates to be rolled out easily.

Evaluation report: MedStamp Communicator secure data transmission solution

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