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(54) METHOD AND SYSTEM FOR MULTIPLE ASYMMETRIC DECRYPTION OF .ZIP FILES

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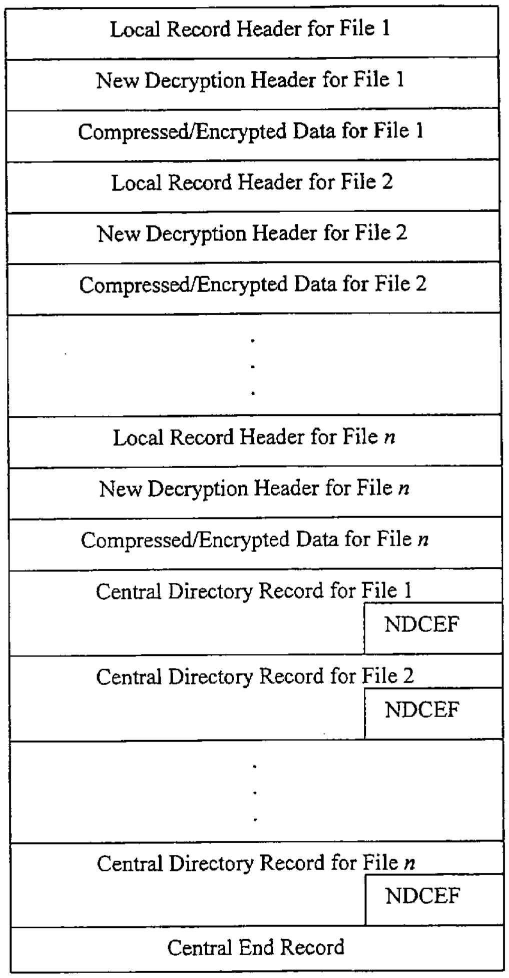
(57) ABSTRACT

The present invention provides a method of integrating existing strong encryption methods into the processing of a .ZIP file to provide a highly secure data container which provides flexibility in the use of symmetric and asymmetric encryption technology. The present invention adapts the well established .ZIP file format to support higher levels of security and multiple methods of data encryption and key management, thereby producing a highly secure and flexible digital container for electronically storing and transferring confidential data.


Local Record Header for File 1
New Decryption Header for File 1
Compressed/Encrypted Data for File 1
Local Record Header for File 2
New Decryption Header for File 2
Compressed/Encrypted Data for File 2
Local Record Header for File n
New Decryption Header for File n
Compressed/Encrypted Data for File n
Central Directory Record for File 1
NDCEF
Central Directory Record for File 2
NDCEF
Central Directory Record for File n
NDCEF
Central End Record

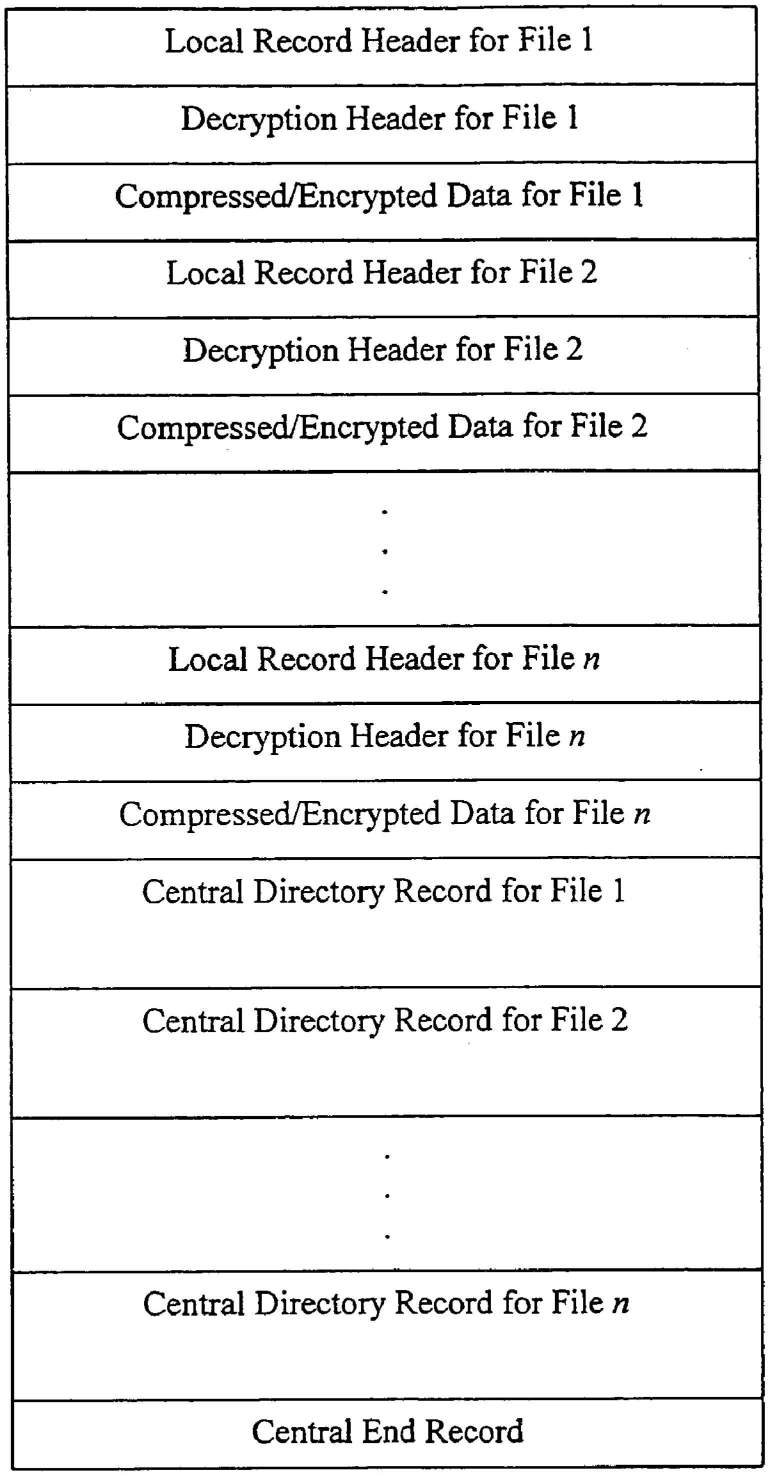

Local Record Header for File 1
Decryption Header for File 1
Compressed/Encrypted Data for File 1
Local Record Header for File 2
Decryption Header for File 2
Compressed/Encrypted Data for File 2
Local Record Header for File *n*
Decryption Header for File *n*
Compressed/Encrypted Data for File *n*
Central Directory Record for File 1
Central Directory Record for File 2
Central Directory Record for File *n*
Central End Record

FIG. 1

PRIOR ART

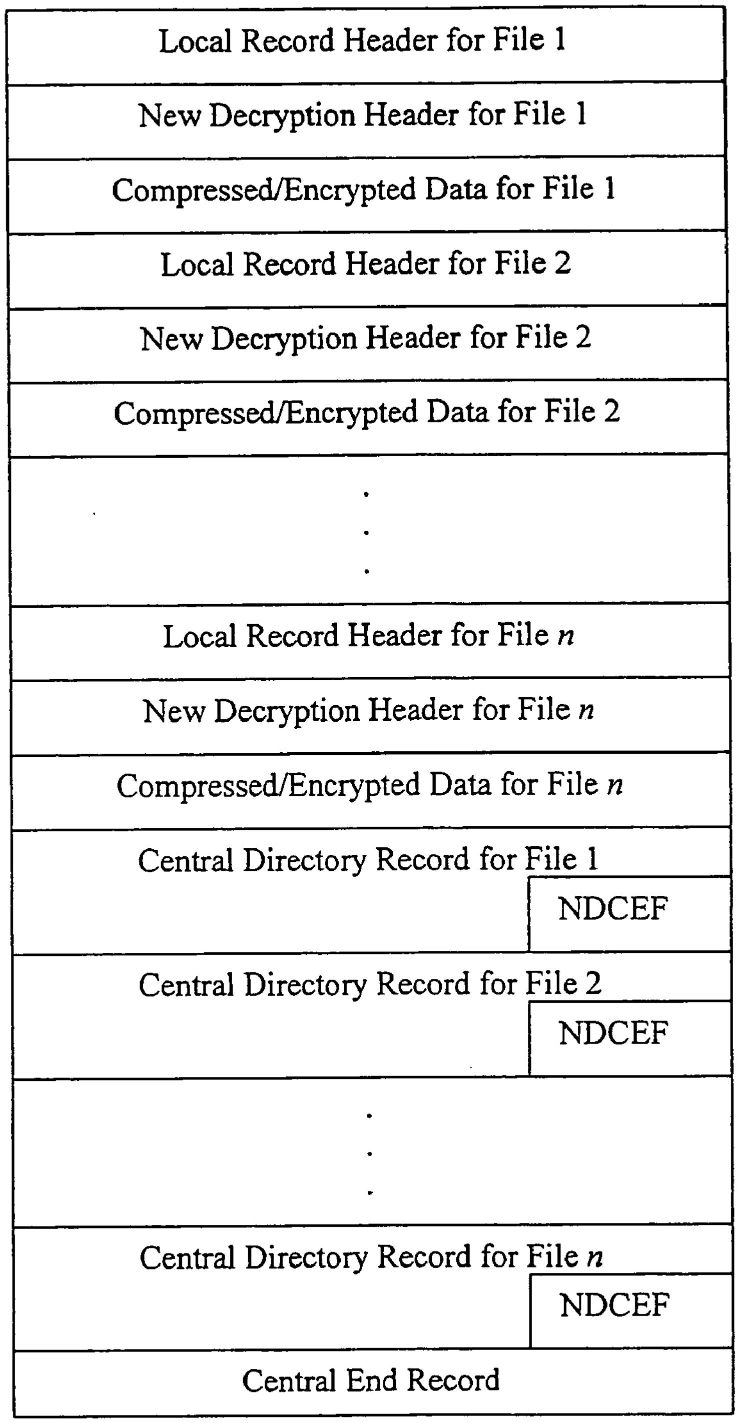

Local Record Header for File 1
New Decryption Header for File 1
Compressed/Encrypted Data for File 1
Local Record Header for File 2
New Decryption Header for File 2
Compressed/Encrypted Data for File 2
Local Record Header for File *n*
New Decryption Header for File *n*
Compressed/Encrypted Data for File *n*
Central Directory Record for File 1
NDCEF
Central Directory Record for File 2
NDCEF
Central Directory Record for File *n*
NDCEF
Central End Record

FIG. 2

METHOD AND SYSTEM FOR MULTIPLE ASYMMETRIC DECRYPTION OF .ZIP FILES

BACKGROUND OF THE INVENTION

[0001] The present invention relates generally to a method of using standard .ZIP files and strong encryption technology to securely store files, and more particularly to a method of integrating existing strong encryption methods into the processing of .ZIP files to provide a highly secure data container which provides flexibility in the use of symmetric and asymmetric encryption technology. The present invention adapts the well established and widely used .ZIP file format to support higher levels of security and multiple methods of data encryption and key management, thereby producing an efficient, highly secure and flexible digital container for electronically storing and transferring confidential data.

[0002] Compression of computer files has been available for many years. Compressing files can save large amounts of disk space, and can reduce transfer time when downloading files from the Internet or transferring files through email. Almost any file one downloads from the Internet is compressed in some way. A standard compressed file or folder as it is sometimes called contains one or more files that were compressed into a single file or folder. Many different compression formats have been developed over the years. The .ZIP format, created by the assignee of the present invention, is perhaps the most common compressed file format for the personal computer. Any file with a ".zip" extension most likely contains one or more files of data archived, that is, each either compressed or stored, in the .ZIP format. "Zipping" a file has become a commonly used term meaning to compress the file into the .ZIP format archive so that it occupies less disk space, and similarly, "unzipping" a file means decompressing a compressed file in the .ZIP format.

[0003] A .ZIP file is generally recognized as a data compression and archiving format invented by PKWARE, Inc. The .ZIP format is a file format designed for combining data compression technology with file archiving techniques. Many commercially available software products are available for compressing or "zipping" files or other data into the .ZIP format. These .ZIP files can then be used to reconstruct the original data through the "unzipping" process. Data compression converts the contents of a file into an encoded format requiring less computer storage space or in the case of transmission less network bandwidth than the original uncompressed file.

[0004] Archiving, in the context of a .ZIP file, is a method of storing information about the characteristics of a file in a catalogue of files, known as the Central Directory, inside the .ZIP file, allowing each file to be retrieved individually by its characteristics. This capability is widely used. These characteristics include, but are not limited to, file name, file size, and file creation date and time.

[0005] Software programs such as PKZIP® written by PKWARE, Inc. are used to process files in the .ZIP format. Such programs allow one or more files of any type to be compressed and archived into a file of the .ZIP format type for efficient file storage and transmission over computer and communication networks. This format and the software programs that process .ZIP files have become ubiquitous.

[0006] Data encryption is used by many software programs to provide data privacy. Data encryption is a method of encoding data so that it cannot be reproduced in its original form unless an associated key is provided. Decryption uses this key to convert the encrypted data back into its original state. The key is known only to the person encrypting the data or by those other people with whom the person encrypting the data chooses to share the key. The key is used to "unlock" the data so that it can again be used in its original form.

[0007] Keys are uniquely generated using data known to the person encrypting a file or other data associated with recipients and users of the file. This data can be a user-defined password or other random data. Several methods are commonly used for processing the keys used for data encryption. Encryption using a key generated from a password is an example of symmetric encryption. Encryption using a public/private key pair is an example of asymmetric encryption. An example of one method for processing encryption keys supported by this invention uses a public/private key pair commonly associated with digital certificates as defined by the document Internet X.509 Public Key Infrastructure Certificate and CRL Profile (RFC 2459). A digital certificate is a unique digital identifier associating a public and private key pair to an assigned individual, a group, or an organization. When used for encrypting data, the public key of an individual is used to process an encryption key which only the individual in possession of the corresponding private key can use for decryption. A digital certificate is issued to an individual, a group, or an organization for a fixed period of time and can only be used during this time period. After the time period has elapsed, the digital certificate will be considered to have expired and must be reissued for a new time period.

[0008] The strength of a data encryption method is determined at least in part by its key size in bits. The larger the key size a data encryption method uses, the more resistant it is to cryptanalysis. Cryptanalysis, or popularly "cracking", is the unauthorized access to encrypted data. Strong encryption is a type of data encryption that uses key sizes of 128 bits or more. A number of encryption encoding methods are known today. Examples supported by the present invention include but are not limited to Advanced Encryption Standard (AES), Data Encryption Standard (DES), 2DES, 3DES, and others. A number of key sizes are commonly used today. Examples supported by the present invention include but are not limited to 128 bits, 192 bits, and 256 bits.

[0009] Many software programs available today that process .ZIP files use data encryption to encrypt files after compression as they are written to the .ZIP file. The data encryption method used by these software programs uses a key size of 96 bits or less and is considered weak or moderate encryption by today's standards. These software programs use keys generated using user-defined password data. Weak data encryption may not provide sufficient security to computer users that store and transfer their confidential data files using the .ZIP format.

[0010] Password-based key generation has been a commonly used method of applying data encryption, however, known vulnerabilities to cracking methods such as "brute force password cracking" make this method of encryption insufficient to meet today's more advanced security needs.

Another known limitation of password-based security is the lack of non-repudiation. Non-repudiation is the ability to be certain that the person or program that created an encrypted .ZIP file cannot deny that fact and that their identity is bound to the .ZIP file they created. This cannot be achieved with symmetric encryption methods. Today, non-repudiation is an important aspect of security related to the implementation of digital certificates and digital signatures. It is critically important to be able to prove that a creator or sender of an encrypted file did in fact create the file, i.e. not repudiate his/her action.

[0011] Therefore, a need exists to extend the options for levels of security available to programs that process .ZIP files. This extended of security capability makes use of the encryption technologies available today or others that may gain acceptance in the future.

SUMMARY OF THE INVENTION

[0012] The present invention provides a method of integrating multiple strong encryption methods into the processing of .ZIP files to provide a highly secure data container which provides flexibility in the use of symmetric and asymmetric encryption technology. The present invention adapts the well established .ZIP file format to support higher levels of security and multiple methods of data encryption and key management, thereby producing a highly secure and flexible digital container for storing and transferring confidential electronic data.

[0013] The present invention provides a method of integrating multiple strong encryption methods into the processing of .ZIP files to provide a highly secure data container which provides flexibility in the use of encryption technology. The present invention supports existing weak encryption methods available in .ZIP software programs used today to ensure backward compatibility with existing software programs that use the .ZIP file format. Strong encryption methods are made available to computer users as configurable options to select when compressing and encrypting their files or other data into a .ZIP file.

[0014] The method of the present invention provides the capability of using strong encryption when creating .ZIP files. It is flexible in that it provides that different encryption methods can be applied to a single .ZIP file to meet the security needs of a given computer user or application. Strong encryption algorithms are preferably used in conjunction with either password (symmetric) or any form of public/private key (asymmetric) encryption methods. The symmetric method preferably includes a password defined by the user, while the asymmetric method preferably includes a public/private key associated with digital certificates to process encryption keys. The invention allows one or more passwords and one or more public keys to be used individually, or in combination at the same time when archiving any file of any type of data into a secure .ZIP file. This capability is useful since secure .ZIP files are frequently distributed, or otherwise made accessible, to multiple recipients for decryption. Some of those recipients may require password access while others may require certificate access.

[0015] The method of the present invention also supports the four basic security functions to be associated with encrypted files: confidentiality, message authentication, sender or creator authentication, and non-repudiation.

[0016] Specifically, the present invention supports non-repudiation to uniquely bind a .ZIP file with the identity of its creator, and prevent that creator from denying the creation of that .ZIP file. One method of non-repudiation used by this invention is the identity support available with digital signatures that can be generated using public/private key technology. The non-repudiation function provided by the present invention also preferably supports time-stamping methods for fixing the creation of a digital signature in time, as well as time-stamped audit trails providing transaction history.

[0017] As indicated, the method of the present invention also supports message authentication. Message authentication ensures the data has not been altered since being encrypted. The present invention supports message authentication techniques that employ public/private key forms of message authentication, as well as other methods of message authentication that do not require the use of public/private keys. One example of an alternative method that does not use a public/private key is a cryptographic checksum.

[0018] The method of the present invention further supports the encryption of file characteristics for each file inside a .ZIP file. Current ZIP software programs encrypt only the contents of the files in a .ZIP file. The additional characteristics for each file, such as its name, size, etc., remain unencrypted. To remove the possibility that this unencrypted data for a file could be made available to an unauthorized user, this information may preferably also be encrypted as an option. This additional encryption further increases the level of security available to .ZIP file users.

[0019] Public keys such as those associated with digital certificates used for encrypting .ZIP file data preferably resides on a user's local computer in a file or a database, on an external device such as a Smart Card or other removable device, or in a shared data repository such as a directory service served by an LDAP server.

[0020] The present invention also provides multiple methods of checking whether a digital certificate is valid for use. These methods preferably include, but are not limited to standard methods of certificate validation, such as searching certificate revocation lists (CRL), certificate trust lists (CTL), and online checking via the internet using Online Certificate Status Protocol (OCSP) or Simple Certificate Validation Protocol (SCVP).

[0021] The method of the present invention also preferably defines data storage locations within the established .ZIP file format specification for storing information on the encryption parameters used when a file was encrypted and on the keys needed when a file is to be decrypted. One such example of these data storage locations includes a field to identify that a new strong encryption method has been applied to a file in the .ZIP file. The strong encryption record will be defined within a Central Directory storage area for each encrypted file. The Central Directory is a storage location defined in the .ZIP file format which serves as a table of contents for the entire .ZIP file. An entry is made into the Central Directory for each file added to a .ZIP file. A decryption record will be defined for storing the information needed to initialize and start the decryption process. This decryption record will be placed immediately ahead of the encrypted data for each file in a .ZIP file. This example is not the only method of storing this data as other storage methods can be defined.

[0022] The present invention provides many advantages or benefits over the prior art. One benefit is the ability to use multiple encryption methods instead of supporting only a single encryption method. A second benefit is the ability to use a mixture of symmetric and asymmetric encryption in a single, secure .ZIP file. A third benefit is that the encryption of individual files using advanced public/private keys provides a significantly higher level of security to computer users. A fourth benefit is that encryption of .ZIP file data can be implemented using a range of commonly available cryptographic toolkits. A fifth benefit is that the present invention supports using packaged or readily available encryption algorithms to provide state-of-the-art security. A sixth benefit is the availability of non-repudiation using digital signatures through the use of public/private key technology. A seventh benefit is that the invention ensures a high degree of interoperability and backward compatibility by extending the current .ZIP file format.

[0023] Various other features, objects, and advantages of the invention will be made apparent to those skilled in the art from the following detailed description, claims, and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] **FIG. 1** is a record layout of a prior art .ZIP file prior to the present invention.

[0025] **FIG. 2** is a record layout of a .ZIP file in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0026] Referring now to the drawings, **FIG. 1** shows the file format for the standard .ZIP file, in existence prior to the present invention. **FIG. 2** illustrates the preferred general record layout of a .ZIP file in accordance with the present invention.

[0027] The newly modified ZIP file format specification according to the present invention, as published by PKWARE, Inc., is described in a document entitled APPNOTE.TXT, which is attached hereto and incorporated herein by reference. The new version of the .ZIP file format provides an implementation of the use of strong encryption based on a key generated using a password. This implementation constitutes one example of a structure and layout of the records and fields suitable for processing secure .ZIP files as defined by the present invention. The complete description of the conventional or standard .ZIP file format will not be included here since this information is generally well known. Only the portions pertaining to the new records and fields defined by the new format, capable of storing data using strong encryption, will be discussed in detail.

[0028] The present invention extends the original .ZIP file format with the addition of new storage records to support the use of strong encryption methods including, as described above, both public/private key, or asymmetric, methods, and password-based, or symmetric, methods, and the capability to use a mixture of symmetric and asymmetric methods.

[0029] An example of implementing a new strong encryption method is discussed below. This example identifies several new records and fields that must be defined within the .ZIP file format.

[0030] A new General Purpose Bit Flag having a hexadecimal value of 0x0040 to be set in both the Local and Central Record Headers when strongly encrypting a file.

[0031] A new Decryption Header to be located immediately ahead of and adjacent to the compressed data stored for each file.

[0032] A new Extra Field record definition with an ID having a hexadecimal value of 0x0017 to be inserted into the Central Record Header for each file.

[0033] When using these new fields for strongly encrypting files, the following actions are indicated.

[0034] 1. If the General Purpose Bit Flag value of 0x0040 is set to indicate strong encryption was applied to a file, the General Purpose Bit Flag value of 0x0001 will also generally be set.

[0035] 2. Files having a size of zero bytes (an empty file) should not generally be encrypted. As indicated, however, the file characteristics of the archived files may be encrypted, even if the file is of zero length and is not itself encrypted.

[0036] 3. The contents of the field labeled Version Needed to Extract in both the Local and Central Record Headers should preferably be set to the decimal value of 50 or greater. If the AES encryption method is used, the contents of the field labeled Version Needed to Extract in both the Local and Central Record Headers should preferably be set to the decimal value 51 or greater.

[0037] 4. Data encryption should preferably be applied after a file is compressed, but encryption can be applied to a file if compression is not used. If compression is not applied to a file, it is considered to be stored in the .ZIP file.

[0038] 5. If encryption is applied using digital certificates, a list of intended recipients will be constructed. Each entry in the recipient list identifies a person whose public key has been used in the encryption process for a file and who is allowed to decrypt the file contents using their private key.

[0039] Record Definitions:

New Decryption Header (NDH)

Value	Size (bytes)	Description
IV size	2	Size of custom initialization vector/salt, if 0 then CRC32 + 64-bit File Size should be used to decrypt data.
IV	variable	Initialization vector/salt (file specific) which should be used in place of CRC32 + 64-bit File Size
Original Size	4	Original (uncompressed) size of the following data
Decryption Info.	variable	Decryption Information

Decryption Information (Details)

[0040]

Value	Size (bytes)	Description
Version (3)	2	Version/Format of decryption information.
AlgID	2	Encryption Algorithm ID
BitLen	2	Bit length of the key
Flags	2	Processing flags
ERD size	2	Size of Encrypted Random Data (ERD)
ERD	variable	Encrypted Random Data
Recipient Count	4	Number of Recipients
Hash Algorithm	2	Hash algorithm to be used to calculate Public Key hash (absent for password based encryption)
Hash Size	2	Size of Public Key hash (absent for password based encryption)
Recipient List Element	variable	Recipient List Element (absent for password based encryption)
Password Validation Data size	2	Size of random password validation data (Includes CRC32 of PVD; >4) MUST be multiple of encryption block sizes
Password, Validation Data	variable	Password Validation Data (PVD)
CRC32 of PVD	4	CRC32 of PVD, used for password verification when decrypting data

[0041] Encryption Algorithm ID (AlgID) identifies which of several possible strong encryption algorithms was used for encrypting a file in the .ZIP file. The strong encryption algorithms that can be used include but are not limited to AES, 3DES, 2DES, DES, RC2 and RC4. The use of other unspecified strong algorithms for encryption is supported by the present invention.

[0042] Hash Algorithm identifies which of several possible hash algorithms was used for the encryption process for a file in the .ZIP file. The algorithms that can be used include but are not limited to MD5, SHA1-SHA512. The use of other unspecified algorithms for hashing is supported by the present invention.

[0043] Flags

[0044] The following values are defined for the processing Flags.

Name	Value	Description
PASSWORD_KEY	0x0001	Password is used
CERTIFICATE_KEY	0x0002	Recipient List is used
COMBO_KEY	0x0003	Either a password or a Recipient List can be used to decrypt a file
DOUBLE_SEED_KEY	0x0007	Both password and Recipient List are required to decrypt a file. ERD is encrypted twice by 2 separate keys.
DOUBLE_DATA_KEY	0x000f	Both a password and a Recipient List are required to decrypt a file. File data is encrypted twice using 2 separate keys.
MASTER_KEY_3DES	0x4000	Specifies 3DES algorithm is used for MSK

[0045] Recipient List Element

Value	Size (bytes)	Description
Recipient Element size	2	Combined size of Hash of Public Key and Simple Key Blob
Hash	Hash Size	Hash of Public Key
Simple key Blob	variable	Simple Key Blob

New Decryption Central Record Extra Field (NDCEF)

[0046]

Value	Size (bytes)	Description
0x0017	2	Signature of NDCEF
Data Size	2	Size of the following data (at least 12 bytes)
Version (2)	2	Version/Format of this extra field.
AlgID	2	Encryption Algorithm ID.
BitLen	2	Bit length of the key
Flags	2	Processing flags
Recipient Count	4	Number of Recipients
Hash Algorithm	2	Hash algorithm to be used to calculate Public Key hash (absent for password based encryption)
Hash Size	2	Size of Public Key hash (absent for password based encryption)
Simplified Recipient List Element	variable	Simplified Recipient List Element (absent for password based encryption)

[0047] Simplified Recipient List Element

Value	Size (bytes)	Description
Hash	Hash Size	Hash of Public Key

[0048] A simplified recipient list element is defined as a subset of a recipient list element and is stored to provide redundancy of the recipient list data for the purposes of data recovery.

[0049] Process Flow:

[0050] The following is a description of the most preferred encryption/decryption process for a single file using the storage format defined by this example. Any programs, software or other processes available to suitably perform the encryption/decryption process may be used.

[0051] Encryption:

[0052] 1. Validate public/private key

[0053] 2. Calculate file digital signature and time-stamp

[0054] 3. Compress or Store uncompressed file data

[0055] 4. Generate a File Session Key (FSK) (see below)

[0056] 5. Calculate Decryption Information size

[0057] 6. Adjust Compressed Size to accommodate Decryption Information and padding

[0058] 7. Save Decryption Information to .ZIP file

[0059] 8. Encrypt Compressed or Stored File Data

[0060] 9. Encrypt file characteristics

[0061] Decryption:

[0062] 1. Decrypt file characteristics

[0063] 2. Read Decryption Information from .ZIP file

[0064] 3. Generate FSK (see below)

[0065] 4. Verify Decryption Information (see below)

[0066] 5. If Decryption Information is valid, then decrypt Compressed or Stored File Data

[0067] 6. Decompress compressed data

[0068] 7. Validate file time-stamp and digital signature

[0069] Generating Master Session Key (MSK)

[0070] 1. If MASTER_KEY_3DES is set, use 3DES 3-key as MSK algorithm, otherwise use specified algorithm.

[0071] 2. If encrypting or decrypting with a password.

[0072] 2.1.1. Prompt user for password

[0073] 2.1.2. Calculate hash of the password

[0074] 2.1.3. Pass calculated hash as argument into a cryptographic key derivation function or its equivalent.

[0075] 3. When encrypting using a public key(s).

[0076] 3.1.1. Call a cryptographic key generation function or its equivalent to generate random key

[0077] 4. When decrypting using a private key(s).

[0078] 4.1. Using Recipient List information, locate private key, which corresponds to one of the public keys used to encrypt MSK.

[0079] 4.2. Decrypt MSK

[0080] Salt and/or Initialization Vector (IV)

[0081] 1. For algorithms that use both Salt and IV, Salt=IV

[0082] 2. IV can be completely random data and placed in front of Decryption Information

[0083] 3. Otherwise IV=CRC32+64-bit File Size

[0084] Adjusting Keys

[0085] 1. Determine Salt and/or Initialization Vector size of the key for the encryption algorithm specified. Usually salt is compliment to 128 bits, so for 40-bit key Salt size will be 11 bytes. Initialization Vector is usually used by block algorithms and its size corresponds to the block size.

[0086] 2. If Salt size>0 or Initialization Vector size is >0 then set IV[1] to be used by the specified encryption algorithm.

[1] When adjusting MSK, if IV is smaller then required Initialization Vector (or Salt) size it is complimented with 0, if it is larger it is truncated. For all other operations IV is used as is without any modifications.

[0087] Generating File Session Key (FSK)

[0088] 1. FSK<-SHA1(MSK(IV)). Adjust MSK with IV, and decrypt ERD (Encrypted Random Data). Calculate hash of IV+Random Data. Pass calculated hash as argument into a cryptographic key derivation function or its equivalent to obtain FSK

[0089] Verifying Decryption Information

[0090] 1. Decryption Information contains variable length Password Validation Data (PVD).

[0091] 2. First Password Validation Data Size—4 bytes are random data, and last 4 bytes are CRC32 of that random data This allows verification that the correct key is used and deters plain text attacks.

[0092] The following modifications are used for encrypting and decrypting multiple files.

[0093] Multi-File Encryption:

[0094] 1. Generate MSK

[0095] 2. For each file follow Encryption steps.

[0096] Multi-File Decryption:

[0097] 1. Generate MSK from the file Decryption Information

[0098] 2. For each file follow Decryption steps

[0099] 3. If Decryption Information verification fails go to step 1

[0100] Alternate storage formats can be defined for implementing the flexible security support within ZIP files. One such alternative is to use other fields, either existing or newly defined to denote that a strong encryption method was applied to a .ZIP archive. Another alternative could be to use additional storage fields in addition to those defined in the above example, or to use the fields as defined, but ordered differently within each record. Still other implementations may use fewer, or more, records or fields than are defined by the above example or the records and fields may be placed in other physical locations within the .ZIP file.

[0101] Alternate processing methods can also be defined for implementing the flexible security support within .ZIP files. One such alternative is to implement the encryption process for each file using another public/private key technology such as that defined by the OpenPGP Message Format as documented in RFC 2440. Another alternative could be to use a more direct form of encryption key generation where the file session key is directly used for encrypting each file. This method would not use the indirect form described in the above example where the file session key is derived from a master key.

[0102] While the invention has been described with reference to preferred embodiments, it is to be understood that the invention is not intended to be limited to the specific embodiments set forth above. Thus, it is recognized that those skilled in the art will appreciate that certain substitutions, alterations, modifications, and omissions may be made without departing from the spirit or intent of the invention. Accordingly, the foregoing description is meant to be exemplary only, the invention is to be taken as including all reasonable equivalents to the subject matter of the invention, and should not limit the scope of the invention set forth in the following claims.

1. A method of providing access to data in a .Zip file format data container, said method including:

receiving a data container constructed in accordance with a .Zip file format, said data container including a first set of encrypted data and a second set of encrypted data;

decrypting at least one of said first set of encrypted data and said second set of encrypted data to form decrypted data, wherein said decrypting includes decrypting said encrypted data using asymmetric decryption; and

providing access to said decrypted data.

2. The method of claim 1 wherein said first set of encrypted data is associated with a first data file included in said data container and said second set of encrypted data is associated with a second data file included in said data container.

3. The method of claim 1 wherein both said first set of encrypted data and said second set of encrypted data are associated with a single data file included in said data container.

4. The method of claim 1 wherein said first set of encrypted data includes first asymmetric key data and said second set of encrypted data includes second asymmetric key data.

5. The method of claim 3 wherein said first set of encrypted data includes first asymmetric key data and said second set of encrypted data includes a data file.

6. The method of claim 4 wherein said first asymmetric key data is not identical to said second asymmetric key data.

7. The method of claim 5 wherein at least one of said first asymmetric key data and said second asymmetric key data is used to decrypt said data file.

8. The method of claim 1 wherein at least one of said first asymmetric key data and said second asymmetric key data are derived from a symmetric key used to decrypt a data file.

9. The method of claim 8 wherein said symmetric key has a key length of at least 128 bits.

10. The method of claim 8 wherein said symmetric key has a key length of at least 192 bits.

11. The method of claim 8 wherein said symmetric key has a key length of at least 256 bits.

12. The method of claim 8 wherein said symmetric key is symmetrically decrypted using an AES decryption decoding.

13. The method of claim 8 wherein said symmetric key is symmetrically decrypted using a 3DES decryption decoding.

14. The method of claim 8 further including decompressing said data file after decrypting said data file.

15. The method of claim 14 wherein said data file is decompressed using a Lempel-Ziv (LZ)-type data decompression algorithm.

16. The method of claim 14 wherein said data file is decompressed using a Deflate-type data decompression algorithm.

17. The method of claim 14 wherein said data file is decompressed using a Burrows-Wheeler Transform (BWT)-type data decompression algorithm.

18. The method of claim 8 wherein said data file is not decompressed.

19. A method of providing access to data in a .Zip file format data container, said method including:

receiving a data container including first asymmetric key data, second asymmetric key data, and an encrypted data file,

wherein both said first asymmetric key data and said second asymmetric key data are associated with said encrypted data file,

wherein said data container is constructed in accordance with a .Zip file format;

receiving decryption key input;

combining said decryption key input with one of said first asymmetric key data and said second asymmetric key data to form a decryption key when said decryption key input matches an input expected by one of said first asymmetric key data and said second asymmetric key data; and

decrypting said encrypted data file using said decryption key to provide access to said data file.

20. The method of claim 19 wherein said first asymmetric key data is not identical to said second asymmetric key data.

21. The method of claim 19 further including using said decryption key input in decrypting said asymmetric key data to provide an input into a decryption operation to decrypt said encrypted data file.

22. The method of claim 19 wherein said decryption key input is a private key.

23. The method of claim 19 wherein at least one of said first asymmetric key data and said second asymmetric key data are derived from a symmetric key used to decrypt said encrypted data file.

24. The method of claim 23 wherein said symmetric key has a key length of at least 128 bits.

25. The method of claim 23 wherein said symmetric key has a key length of at least 192 bits.

26. The method of claim 23 wherein said symmetric key has a key length of at least 256 bits.

27. The method of claim 23 wherein said symmetric key is symmetrically decrypted using an AES decryption decoding.

28. The method of claim 23 wherein said symmetric key is symmetrically decrypted using a 3DES decryption decoding.

29. The method of claim 23 further including decompressing said encrypted data file after decrypting said data file.

30. The method of claim 29 wherein said data file is decompressed using a Lempel-Ziv (LZ)-type data decompression algorithm.

31. The method of claim 29 wherein said data file is decompressed using a Deflate-type data decompression algorithm.

32. The method of claim 29 wherein said data file is decompressed using a Burrows-Wheeler Transform (BWT)-type data decompression algorithm.

33. The method of claim 23 wherein said data file is not decompressed.

34. A method of providing access to data in a .Zip file format data container, said method including:

receiving a data container including:

first asymmetric key data;

second asymmetric key data; and

an encrypted data file,

wherein said first asymmetric key data is derived from an asymmetric encryption, using a first asymmetric key, of symmetric key data formed from a symmetric key used to encrypt said encrypted data file,

wherein said second asymmetric key data is derived from an asymmetric encryption, using a second asymmetric key, of said symmetric key data formed from said symmetric key used to encrypt said encrypted data file

wherein said data container is constructed in accordance with a .Zip file format; and

providing the option of:

using said first asymmetric key data to recover said symmetric key to decrypt said encrypted data file when a first desired input is received; and

using said second asymmetric key data to recover said symmetric key to decrypt said encrypted data file when a second desired input is received.

35. The method of claim 34 wherein said decryption key input is a private key.

36. The method of claim 34 wherein said first asymmetric key data is not identical to said second asymmetric key data.

37. The method of claim 34 wherein said symmetric key has a key length of at least 128 bits.

38. The method of claim 34 wherein said symmetric key has a key length of at least 192 bits.

39. The method of claim 34 wherein said symmetric key has a key length of at least 256 bits.

40. The method of claim 34 wherein said symmetric key is symmetrically decrypted using an AES decryption decoding.

41. The method of claim 34 wherein said symmetric key is symmetrically decrypted using a 3DES decryption decoding.

42. The method of claim 34 further including decompressing said data file after said data file is decrypted.

43. The method of claim 42 wherein said data file is decompressed using a Lempel-Ziv (LZ)-type data decompression algorithm.

44. The method of claim 42 wherein said data file is decompressed using a Deflate-type data decompression algorithm.

45. The method of claim 42 wherein said data file is decompressed using a Burrows-Wheeler Transform (BWT)-type data decompression algorithm.

46. The method of claim 34 wherein said data file is not decompressed.

47. A method of providing access to data in a data container, said method including:

receiving a data container designed for containing compressed files, said data container including a first set of encrypted data and a second set of encrypted data;

decrypting at least one of said first set of encrypted data and said second set of encrypted data to form decrypted data, wherein said decrypting includes decrypting said encrypted data using asymmetric decryption; and

providing access to said decrypted data.

48. The method of claim 47 wherein said first set of encrypted data is associated with a first data file included in said data container and said second set of encrypted data is associated with a second data file included in said data container.

49. The method of claim 47 wherein both said first set of encrypted data and said second set of encrypted data are associated with a single data file included in said data container.

50. The method of claim 47 wherein said first set of encrypted data includes first asymmetric key data and said second set of encrypted data includes second asymmetric key data.

51. The method of claim 49 wherein said first set of encrypted data includes first asymmetric key data and said second set of encrypted data includes a data file.

52. The method of claim 50 wherein said first asymmetric key data is not identical to said second asymmetric key data.

53. The method of claim 51 wherein at least one of said first asymmetric key data and said second asymmetric key data is used to decrypt said data file.

54. The method of claim 47 wherein at least one of said first asymmetric key data and said second asymmetric key data are derived from a symmetric key used to decrypt a data file.

55. The method of claim 54 wherein said symmetric key has a key length of at least 128 bits.

56. The method of claim 54 wherein said symmetric key has a key length of at least 192 bits.

57. The method of claim 54 wherein said symmetric key has a key length of at least 256 bits.

58. The method of claim 54 wherein said symmetric key is symmetrically decrypted using an AES decryption decoding.

59. The method of claim 54 wherein said symmetric key is symmetrically decrypted using a 3DES decryption decoding.

60. The method of claim 54 further including decompressing said data file after decrypting said data file.

61. The method of claim 60 wherein said data file is decompressed using a Lempel-Ziv (LZ)-type data decompression algorithm.

62. The method of claim 60 wherein said data file is decompressed using a Deflate-type data decompression algorithm.

63. The method of claim 60 wherein said data file is decompressed using a Burrows-Wheeler Transform (BWT)-type data decompression algorithm.

64. The method of claim 54 wherein said data file is not decompressed.

65. The method of claim 47 wherein said data container is constructed in accordance with a .Zip file format.

66. A method of providing access to data in a data container, said method including:

receiving a data container including first asymmetric key data, second asymmetric key data, and an encrypted data file,

wherein both said first asymmetric key data and said second asymmetric key data are associated with said encrypted data file,

wherein said data container is designed for containing compressed files; and

receiving decryption key input;

combining said decryption key input with one of said first asymmetric key data and said second asymmetric key data to form a decryption key when said decryption key input matches an input expected by one of said first asymmetric key data and said second asymmetric key data; and

decrypting said encrypted data file using said decryption key to provide access to said data file.

67. The method of claim 66 wherein said first asymmetric key data is not identical to said second asymmetric key data.

68. The method of claim 66 further including using said decryption key input in decrypting said asymmetric key data to provide an input into a decryption operation to decrypt said encrypted data file.

69. The method of claim 66 wherein said decryption key input is a private key.

70. The method of claim 66 wherein at least one of said first asymmetric key data and said second asymmetric key data are derived from a symmetric key used to decrypt said encrypted data file.

71. The method of claim 70 wherein said symmetric key has a key length of at least 128 bits.

72. The method of claim 70 wherein said symmetric key has a key length of at least 192 bits.

73. The method of claim 70 wherein said symmetric key has a key length of at least 256 bits.

74. The method of claim 70 wherein said symmetric key is symmetrically decrypted using an AES decryption decoding.

75. The method of claim 70 wherein said symmetric key is symmetrically decrypted using a 3DES decryption decoding.

76. The method of claim 70 further including decompressing said encrypted data file after decrypting said data file.

77. The method of claim 76 wherein said data file is decompressed using a Lempel-Ziv (LZ)-type data decompression algorithm.

78. The method of claim 76 wherein said data file is decompressed using a Deflate-type data decompression algorithm.

79. The method of claim 76 wherein said data file is decompressed using a Burrows-Wheeler Transform (BWT)-type data decompression algorithm.

80. The method of claim 70 wherein said data file is not decompressed.

81. The method of claim 66 wherein said data container is constructed in accordance with a .Zip file format.

82. A method of providing access to data in a data container, said method including:

receiving a data container including:

first asymmetric key data;

second asymmetric key data; and

an encrypted data file,

wherein said first asymmetric key data is derived from an asymmetric encryption, using a first asymmetric key, of symmetric key data formed from a symmetric key used to encrypt said encrypted data file,

wherein said second asymmetric key data is derived from an asymmetric encryption, using a second asymmetric key, of said symmetric key data formed from said symmetric key used to encrypt said encrypted data file

wherein said data container is designed for containing compressed files; and

providing the option of:

using said first asymmetric key data to recover said symmetric key to decrypt said encrypted data file when a first desired input is received; and

using said second asymmetric key data to recover said symmetric key to decrypt said encrypted data file when a second desired input is received.

83. The method of claim 82 wherein said decryption key input is a private key.

84. The method of claim 82 wherein said first asymmetric key data is not identical to said second asymmetric key data.

85. The method of claim 82 wherein said symmetric key has a key length of at least 128 bits.

86. The method of claim 82 wherein said symmetric key has a key length of at least 192 bits.

87. The method of claim 82 wherein said symmetric key has a key length of at least 256 bits.

88. The method of claim 82 wherein said symmetric key is symmetrically decrypted using an AES decryption decoding.

89. The method of claim 82 wherein said symmetric key is symmetrically decrypted using a 3DES decryption decoding.

90. The method of claim 82 further including decompressing said data file after said data file is decrypted.

91. The method of claim 90 wherein said data file is decompressed using a Lempel-Ziv (LZ)-type data decompression algorithm.

92. The method of claim 90 wherein said data file is decompressed using a Deflate-type data decompression algorithm.

93. The method of claim 90 wherein said data file is decompressed using a Burrows-Wheeler Transform (BWT)-type data decompression algorithm.

94. The method of claim 82 wherein said data file is not decompressed.

95. The method of claim 82 wherein said data container is constructed in accordance with a .Zip file format.

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