

CIPHERMAIL EMAIL ENCRYPTION

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# Ciphermail white paper

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## Introduction

Most email is sent as plain text. This means that anyone who can intercept email messages, either in transit or at rest, can read the content. Today, companies and governments realize that this is unacceptable. Email needs to be confidential, email needs to be encrypted.

Ciphermail's email encryption products will secure your email and protect messages against unauthorized access, both in transit and at rest.

*Ciphermail Email Encryption Gateway* is a standards based centrally managed email server (MTA) that encrypts and decrypts your incoming and outgoing email at the gateway level. Ciphermail Email Encryption Gateway is compatible with any existing email infrastructure like Microsoft Exchange and Lotus Notes and has support for S/MIME, OpenPGP and PDF encryption. The built-in Data Leak Prevention (DLP) module can be used to prevent certain information to leave the organization via email.

Ciphermail can be installed on most Linux and Unix based systems. Installation packages are available for Ubuntu/Debian, Red Hat/CentOS and OpenSUSE. A ready to run virtual appliance for VMware and Hyper-V is available.

*Ciphermail for BlackBerry®* is an add-on to the Ciphermail Email Encryption Gateway which can be used to send and receive S/MIME digitally signed and encrypted email from a BlackBerry® smartphone.

*Ciphermail for Android* is an Android application which can be used with your existing Android mail application to send and receive S/MIME digitally signed and encrypted email with an Android smartphone. Ciphermail for Android can be used to encrypt all email on an Android smartphone.

## Ciphermail Email Encryption Gateway

Ciphermail email encryption gateway is a centrally managed email server (MTA) which encrypts and decrypts your incoming and outgoing email. Because Ciphermail functions as a general SMTP email server, it is compatible with any existing email infrastructure and can easily be placed before or after existing email servers. Ciphermail is typically installed as a “store and forward” server. Email is therefore only temporarily stored until it is forwarded to it's final destination.

**“Ciphermail is compatible with any existing email infrastructure like Microsoft Exchange and Lotus Domino”**

Ciphermail currently supports three encryption standards: S/MIME, OpenPGP and PDF encryption. S/MIME and OpenPGP provide authentication, message integrity and non-repudiation and protection against message interception. S/MIME and OpenPGP use public key encryption (PKI) for encryption

and signing. Email that is encrypted and/or digitally signed by Ciphermail can be read in Outlook, Thunderbird and other mail clients, provided the user has the proper email certificates installed.

Despite the fact that products like Ciphermail makes S/MIME and OpenPGP fairly easy to use, some recipients might find S/MIME or PGP encryption too cumbersome. Especially when you only need to exchange secure email once, or a few times over a longer period, installing an S/MIME certificate or PGP key might be more problematic than it's worth. To accommodate for those situations, we have included a PDF encryption module in Ciphermail. You can configure Ciphermail to automatically convert outgoing email, including all attachments, to a password encrypted PDF document using standard PDF encryption techniques.

Various password modes are supported: *a)* Encrypt with a pre-defined static password; *b)* Encrypt with a randomly generated password which is then sent by SMS Text to the recipient; *c)* Encrypt with a randomly generated password which is then sent back to the sender by email; or, *d)* Encrypt with a password generated using a One Time Password (OTP) algorithm.

By using a separate channel for sending passwords, PDF encryption is almost as secure as full S/MIME or PGP encryption, provided that the password is long enough to withstand a brute force attack. PDF encryption in Ciphermail is intuitive and easy. There is no need to specifically instruct end-users.

Ciphermail is compatible with any existing CA server (like EJBCA or Microsoft CA) and with certificates from external commercial and non commercial Certificate Authorities (CAs) like Verisign, Comodo and CACert. Alternatively, Ciphermail contains a basic CA server which allows you to create certificates for internal and external users. Certificates can be transported to external recipients in a password protected format. The password can be automatically generated and provided to the recipient as an SMS Text message. Installation of the certificate in the recipients mail client is straightforward. This allows you to setup your own private PKI with external recipients.

### **General features**

- Web based interface.
- Supports virtually unlimited number of users and certificates.
- Sender notification after email encryption.
- Settings can be specified at gateway, domain and user level.
- Automatic backup to remote shares at set intervals.
- Separate back-(encryption engine) and front-end (SOAP API).
- Java, Spring based. Services can be easily replaced and/or extended.
- AGPLv3 licensed (for closed source license or OEM please contact us).
- Packages available for Ubuntu, Debian, RedHat/Centos.

- Ready-to-run Virtual Appliance for VMware ESX/ESXi/Workstation/Player and Hyper-V available.
- TAR distribution available for other systems that support Java and Postfix.

### **S/MIME features**

- S/MIME 3.1 (X.509, RFC 3280).
- Built-in CA which can be used to securely issue certificates for internal and external users.
- Automatic and manual certificate selection.
- Domain certificates (encryption to domains with just one certificate).
- Certificates are automatically extracted from incoming email.
- Support for multiple certificates per sender/recipient.
- Validation of signed email.
- Certificate revocation lists (CRLs) are automatically downloaded (LDAP and HTTP).
- Certificate trust lists (CTLs) can be used to black or white-list certificates.
- Compatible with existing S/MIME implementations (Outlook, Lotus Notes, Thunderbird etc.).
- S/MIME support for Blackberry BIS users with Blackberry add-on.
- Optional support for Hardware Security Modules (HSM).
- Integrates with EJBCA and Comodo EPKI.

### **OpenPGP features**

- OpenPGP RFC 4880.
- PGP/INLINE and PGP/MIME (RFC 3156).
- Secret keys can be generated and revoked.
- Keys can be downloaded and uploaded to remote key servers (HKP).
- Domain keys (encryption to certain domains with a domain key).
- Keys can be automatically extracted from incoming email.
- Validation of signed email.
- Optional support for Hardware Security Modules (HSM).

## PDF email encryption features

- Email is automatically converted to an encrypted PDF (including all attachments).
- PDF is encrypted with AES-128.
- PDF passwords can be automatically generated.
- PDF passwords can be sent by SMS, generated using a One Time Password algorithm, or sent back to sender.
- The recipient can reply using the built-in secure portal.

## DLP features

- Outgoing email can be scanned on keywords and regular expressions.
- Keywords and regular expressions can be specified at gateway, domain and user level.
- Messages can be blocked or quarantined when a rule is violated.
- Email encryption can be forced when a rule matches.
- DLP managers will be notified when a rule is violated.
- DLP managers can release quarantined email.
- If allowed, users can manage their own quarantined email.
- Email bodies, attachments and nested attachments of type text, html, xml and other text-based formats are supported (support for pdf, doc, xls, zip etc. will be added to future versions of Ciphermail).

## Ciphermail Email Encryption Gateway with content/virus scanner

Most organizations need to scan all incoming and outgoing email for viruses. A typical setup of an encryption gateway and a virus scanner can be see in figure 1.

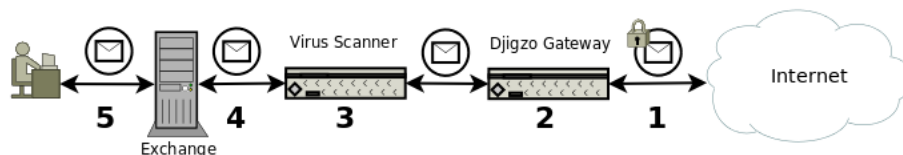


Figure 1: Virus scanning

**Ciphermail with virus scanning:**

1. S/MIME encrypted message is received from the Internet.
2. Ciphermail gateway decrypts the message.
3. The decrypted message is scanned for viruses.
4. After virus scanning the message is forwarded to Exchange.
5. User reads the message.

A more advanced setup is required when email must be encrypted on the desktop yet all outgoing email must be virus scanned because of corporate policies. Figure 1 shows how encrypted outgoing email can be virus scanned.

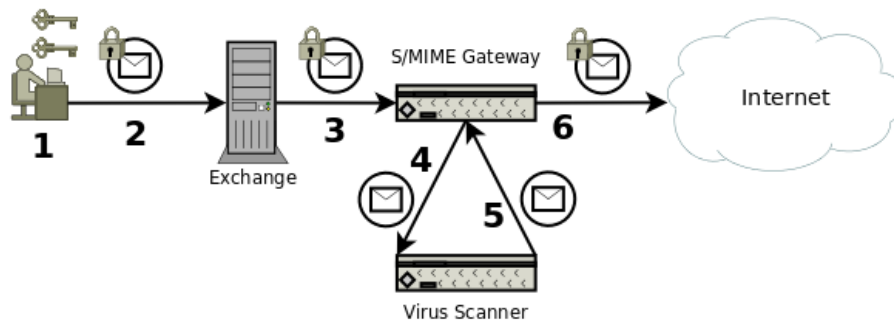


Figure 2: Virus scanning with desktop encryption

**Ciphermail with desktop encryption and virus scanning:**

1. User encrypts message.
2. S/MIME encrypted message is sent to Exchange.
3. Exchange sends S/MIME encrypted message to Ciphermail gateway.
4. Ciphermail gateway decrypts the message with the senders private key (the gateway stores a copy of the key) and sends the decrypted message to the virus scanner.
5. Virus scanner scans the message and if clean it will be sent back to the Ciphermail gateway.
6. The Ciphermail gateway re-encrypts the message and sends the message to the external recipient.

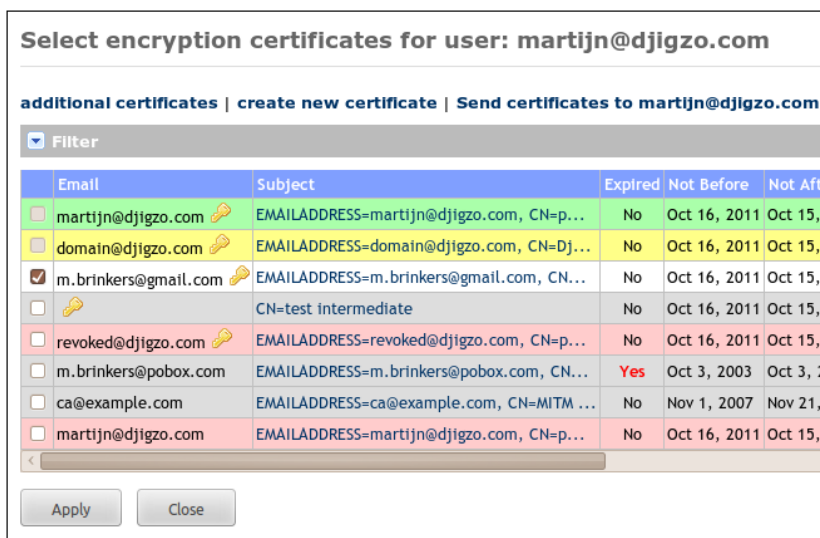


Figure 3: Select encryption certificates

## S/MIME

S/MIME is based on *Public Key Infrastructure* (PKI) and uses X.509 certificates. Public Key Infrastructure is a technology which can be used to securely exchange information over insecure networks using public key cryptography. PKI uses X.509 certificates to bind a public key to an identity. The main advantage of PKI is that there is no need to directly trust everyone involved because trust can be inferred.

**“S/MIME is supported by most email clients.”**

S/MIME uses a hierarchical trust model. Most email clients, like Outlook and Lotus Notes, support S/MIME out of the box. If required, Ciphermail will automatically select the correct certificates for signing and encryption based on strict PKI rules. Only certificates that are valid (i.e., trusted, not expired, not revoked) are automatically used (see figure 3)

## PDF encryption

PDF encryption can be used as a light-weight alternative to S/MIME encryption. PDF allows you to decrypt and read encrypted PDF documents. The basic idea of Ciphermail PDF email encryption is that the complete message, including all attachments, sent by a user is converted to a password encrypted PDF document<sup>1</sup>. A standard message, with the encrypted PDF attached, is then sent to the recipient. The recipient can open the PDF by entering the password.

Various password modes are supported: a) Encrypt with a pre-defined static

<sup>1</sup>The PDF is encrypted with AES-128



password; b) Encrypt with a randomly generated password which is then sent by SMS Text to the recipient; c) Encrypt with a randomly generated password which is then sent back to the sender by email; or, d) Encrypt with a password generated using a One Time Password (OTP) algorithm.

**“PDF encryption in Ciphermail is intuitive and easy. There’s no need to specifically instruct end-users.”**

A PDF encrypted message looks similar to figure 4. All email clients, including webmail like Gmail, Hotmail etc. are supported. The message contains a general message which is based on a configurable template. The encrypted PDF is attached to the message. The PDF can be opened with any PDF reader.



Figure 4: Message with encrypted PDF

After decryption, the PDF will be opened by the default PDF reader. The PDF will be shown as an email message. All attachments can be accessed from the attachment pane (see figure 5). The recipient can securely reply to the encrypted PDF by clicking the reply link in the PDF.

## Data Leak Prevention

Data Leak Prevention (DLP) is a feature that prevents certain information to leave the organization via email. What information this is, is defined in the configuration of the DLP system. Typically, it includes credit card numbers, bank

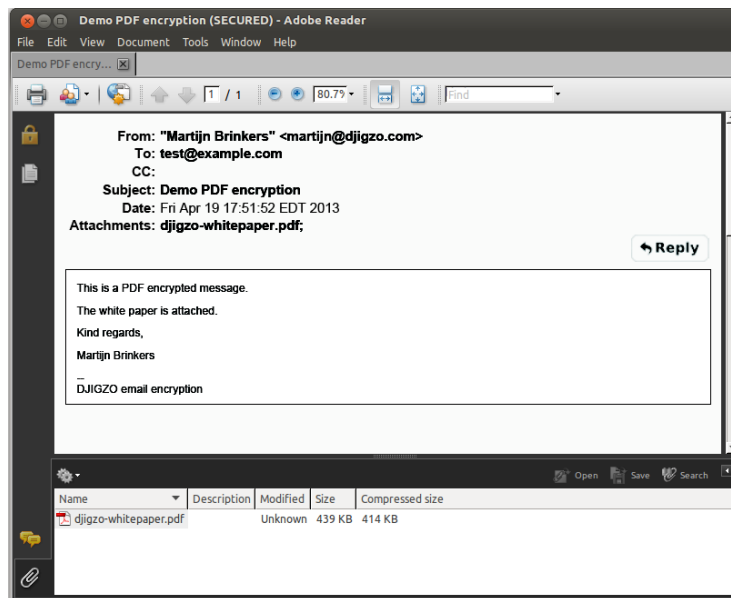


Figure 5: PDF decrypted message. Attachments can be opened from the attachment pane. The recipient can securely reply by clicking the *Reply* link.

account numbers, excessive amounts of email addresses or other personal information in one email message, etc. DLP is implemented as a filter on outgoing email. DLP can be a separate system or product, or it can be integrated with another email related product or system. Ciphermail has integrated DLP with our Email Encryption Gateway.

DLP can monitor email at various levels:

- email body content
- email headers
- email attachments of various types
- nested attachments of various types

Ciphermail DLP currently filters email bodies, attachments and nested attachments of type text, html, xml and other text-based formats. Filtering attachments of type pdf, doc, xls etc. will be part of a future offering of Ciphermail DLP.

Configuring DLP is done via the Ciphermail Web GUI. You can specify keywords and sentences that outgoing email messages should not contain. More elaborate filtering is achieved via *regular expressions*, a specification format that allows you to specify virtually any combination of characters, words or sentences that should be filtered. Sample regular expression configuration files can be downloaded from our web site.

DLP can be configured on three levels, similar to how encryption is configured: at gateway level, at domain level and at individual user level. The latter is

useful in specific cases where some users can send out information via email that other users cannot.

If a policy is violated, the gateway can send a notification message to the sender of the message and/or to the DLP managers. If a message has been quarantined and the sender or one of the DLP managers clicks on the link from the quarantine notification message, the quarantine email information page will be opened in the web browser (see figure 6). Depending on the authorizations of the sender, the sender can download, release or delete the quarantined message.

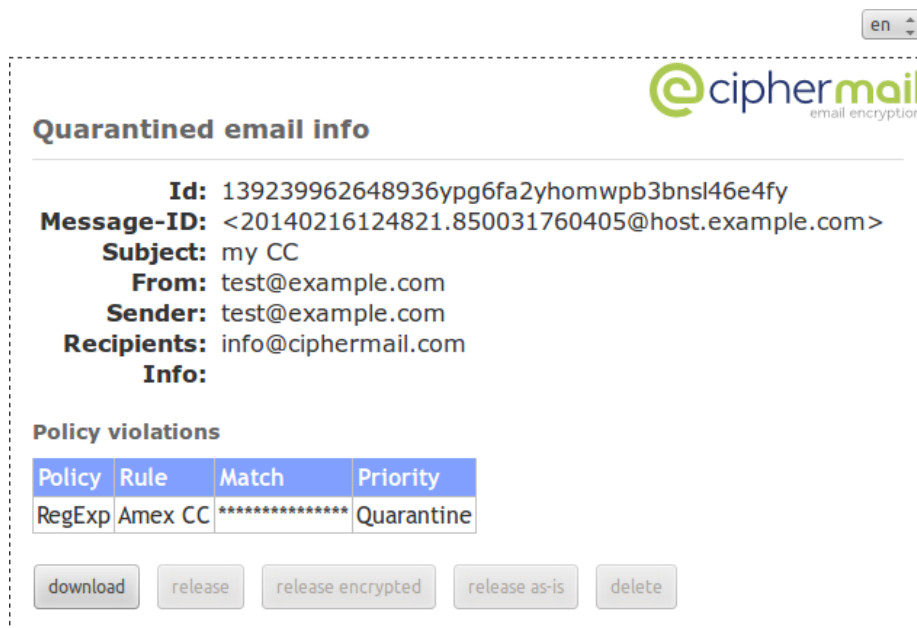


Figure 6: Quarantined email

## Ciphermail for BlackBerry

The BlackBerry® smartphone is the most secure generally available smartphone on the market. All communication between a BlackBerry Enterprise Server (BES) and a BlackBerry smartphone is encrypted with 3DES or AES. For added security the S/MIME support package can be installed allowing email to be digitally signed and encrypted using digital certificates. BlackBerry Internet Service (BIS) users however, do not have the same level of protection that BES users have.

**“With Ciphermail for BlackBerry, all email on the BlackBerry is S/MIME encrypted.”**

Even though all communication between the carriers BIS and a BlackBerry smartphone is encrypted, data from the carriers BIS to the Internet is not.

Email sent to and from a BlackBerry smartphone goes without any protection and can potentially be intercepted and/or modified by any intermediate gateway. It is unfortunate that even though the BlackBerry smartphone has built-in functionality to handle S/MIME encrypted email, the S/MIME support package is not supported by BIS.

Ciphermail for BlackBerry is an add-on to the Ciphermail Email Encryption Gateway which can be used to send and receive S/MIME digitally signed and encrypted email from a BlackBerry smartphone. Ciphermail for BlackBerry is used in combination with the Ciphermail Email Encryption Gateway. Ciphermail for BlackBerry integrates with the built-in BlackBerry mail application.

## Features

- S/MIME encryption and digital signing using X.509 certificates.
- Compatible with BIS.
- Is compatible with existing S/MIME clients (like Outlook and Lotus Notes).
- Message body and attachments are encrypted.
- HTML email support.
- Uses BlackBerry encryption functionality (3DES, AES, X.509, S/MIME).
- Uses the BlackBerry built-in key and certificate store.
- Is compatible with the BlackBerry smart card reader.
- Encrypted messages sent from BlackBerry smartphone are securely relayed by the Ciphermail gateway via an encrypted S/MIME tunnel.
- Because email is relayed by the Ciphermail gateway, email sent from the BlackBerry can be easily archived using any existing email archiving functionality.
- Messages are stored on the BlackBerry smartphone in encrypted form.
- Because email is relayed by the Ciphermail gateway, all email originates from the companies IP range. This is especially useful when the companies domains have SPF records setup.

## Ciphermail for Android

Ciphermail for Android is an Android application which can be used with your existing Android mail application to send and receive S/MIME digitally

**“Ciphermail for Android can be used to encrypt all Gmail email.”**

signed and encrypted email with an Android smartphone. Ciphermail for Android can be used to encrypt all email on an Android smartphone.

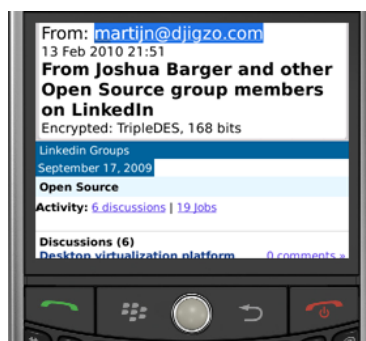


Figure 7: BlackBerry S/MIME encrypted HTML message.

**Features:** Ciphermail for Android has the following features:

- Encryption and digital signing with S/MIME 3.1 (X.509, RFC 3280).
- Can be used with the Android Gmail application.
- Compatible with existing S/MIME clients (like Outlook, Lotus Notes, Thunderbird etc.)
- Message body and attachments are encrypted.
- HTML email support.
- Certificates are automatically extracted from incoming email.
- Certificate revocation lists (CRLs) are automatically downloaded (LDAP and HTTP).
- Certificate trust lists (CTLs) can be used to black or white-list certificates.
- External LDAP servers can be queried for new certificates.
- Can generate self-signed certificates for a “private-PKI”.

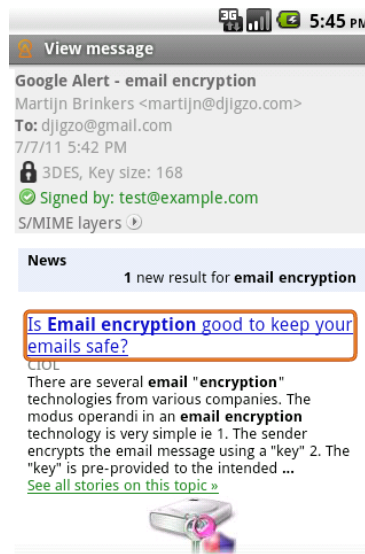


Figure 8: Android S/MIME decrypted HTML message.

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