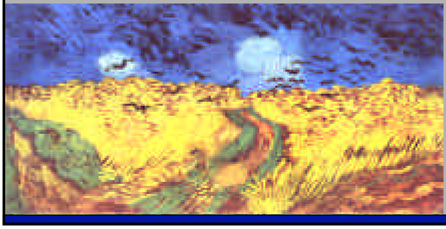
CU IT-Security
noventum consulting GmbH

Secure Messaging

Which kind of solution is the best for you?



"LKBQ EFKD FPPR OBKL QEFK DFPP ROBY RQKL QEFK DFPK LQXI TXVP PROB."

Joachim Ringelnatz

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Agenda

- Background Information
- Standard Solutions
- Virtual Post Offices
- Organizational Aspects
- Summary

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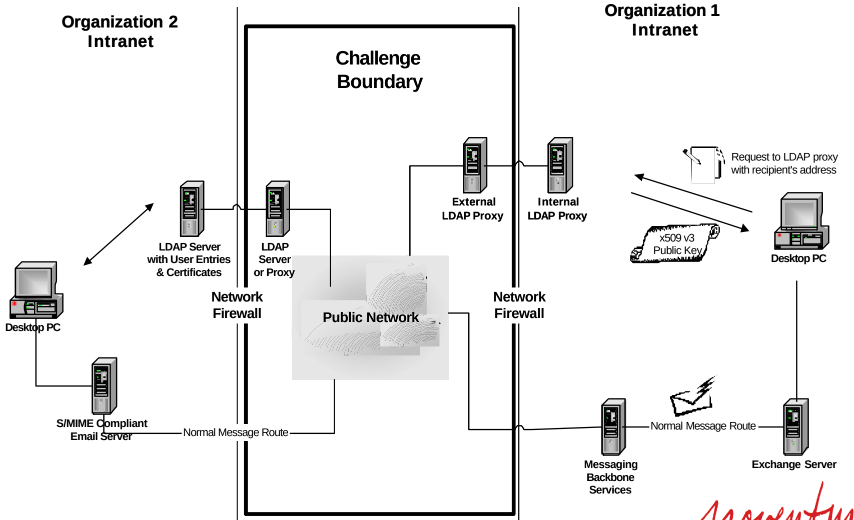
The Secure Messaging Challenge 2001

The Challenge

Enable organizations to exchange strongly encrypted email using a standards-based, vendor neutral architecture that does not require manual key exchange.

Challenge Architecture



Organization 2 Intranet

Challenge Boundary

Organization 1 Intranet

Request to LDAP proxy with recipient's address

External LDAP Proxy

Internal LDAP Proxy

x509 v3 Public Key

Desktop PC

LDAP Server with User Entries & Certificates

LDAP Server or Proxy

Network Firewall

Public Network

Network Firewall

Desktop PC

S/MIME Compliant Email Server

Normal Message Route

Normal Message Route

Messaging Backbone Services

Exchange Server

Technical Requirements - Standards

- Use X.509 v3 CA Services
  - Self-signed or purchased commercial certificates
  - RSA algorithm with minimum 1024-bit key length
- Provide standards-based directory services accessible via the public Internet
  - Certificate stored in standard *userCertificate* attribute
- Provide S/MIME compliant messaging client capable of requesting certificates from the directory
- Provide S/MIME compliant email system
- Follow current standards regarding **S/MIME**, **X.509 v3** and **LDAP v3**

COTS or open source products only

Standard Solutions

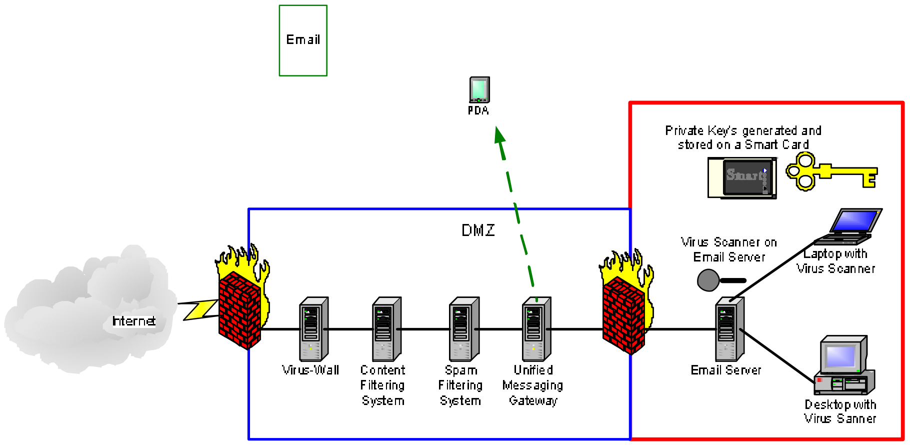
- **End/Site – to – End Security**
  - Use of Standard Clients (e.g. Outlook XX, Netscape, Lotus Notes…)
  - Message will be encoding and decoding on the Client
  - Generation of electronic Signatures on the Client
  - Every User needs one or more X.509 Certificates
  - Roll out of the participating Company CA Certificates
  - If you use no LDAP proxy or central configuration database, you have to distribute the directory configuration information of the other interested firms to all clients.

Advantage vs. Disadvantage – Standard Solution

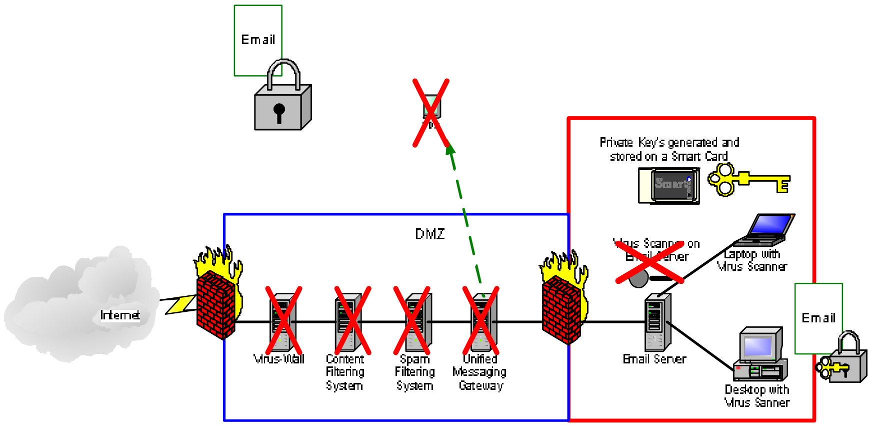
- **Advantages**
  - Economical solution, without investment in addition software
  - Fast realization possible

- **Disadvantages**
  - No central Content and Spam Filtering
  - No multi level Antivirus Scanning
  - No Unified Messaging Solution can work with encrypted emails
  - Last bastion is the desktops or notebook
  - Each user needs at least one X.509 Certificate
  - Roll out of the interested partner CA certificates necessary
  - Distribution of the directory configuration information of the other interested firms necessary

Standard Network


Email
PDA
Private Key's generated and stored on a Smart Card
Smart
DMZ
Virus Scanner on Email Server
Laptop with Virus Scanner
Internet
Virus-Wall
Content Filtering System
Spam Filtering System
Unified Messaging Gateway
Email Server
Desktop with Virus Sanner

Standard Network with Encrypted Emails



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Email

Virtual Post Offices

- **End/Site – to – End Security**
  - Message decoding with User interaction – Solution A
  - Message decoding without User interaction – Solution B
- **End/Site – to – Site Security**
  - Central Message decoding and Signing with a Company certificate – Solution C

Virtual Post Office – Solution A (1/3)

- **Functional method**
  - Encrypted email is stored in a special gateway
  - Gateway forwards the email header with symmetric key to Recipient
  - Recipient encrypts the symmetric key with his private key and he decrypts the symmetric key with the Gateway key (symmetric or asymmetric)
  - Gateway decrypts the symmetric key and than the Gateway decrypts the email
  - Gateway scans the email for Viruses and filters the Content in a Black box.
  - If the email is ok than the Gateway forwards the encrypted Email to the User
  - User decrypts the email on his desktop

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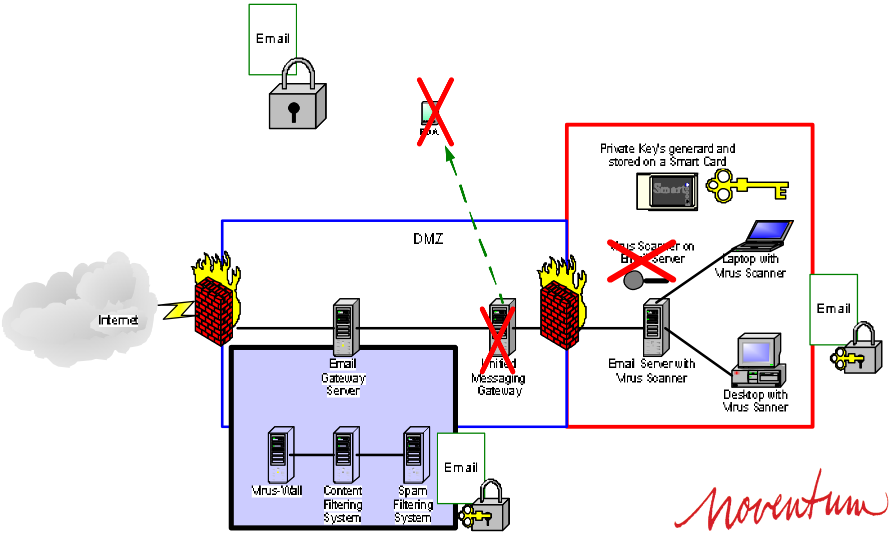
Virtual Post Office – Solution A (2/3)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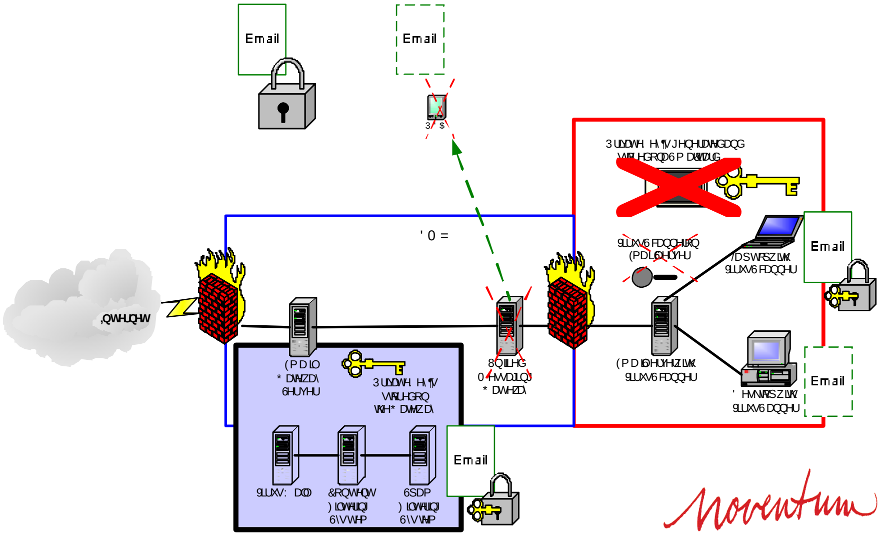
Virtual Post Office – Solution A (3/3)

- **Advantages**
  - Virus scanning and Content/Spam filtering is possible
  - Two-level virus scanning concept can be realized
- **Disadvantages**
  - No Unified Messaging Solution will be supported
  - Proprietary solution
  - Client plug in for Gateway interaction and Gateway is necessary – investment
  - Attack points are
    - gateway
    - data transmission between client and gateway
  - Each user needs at least one X.509 Certificate
  - Roll out of the interested partner CA certificates necessary
  - Distribution of the directory configuration information of the other interested firms necessary

Virtual Post Office – Solution B (1/3)

- **Functional method**
  - The private keys of the recipients are stored in a secure gateway environment.
  - Encrypted emails will decrypt at the gateway.
  - Gateway scans the email for Viruses and filters the Content in a Black box.
  - If the email is ok than the Gateway forwards the encrypted Email to the User.
  - User decrypts the email on his desktop
  - Gateway can also forward the email unencrypted to the Recipient.

Virtual Post Office – Solution B (2/3)



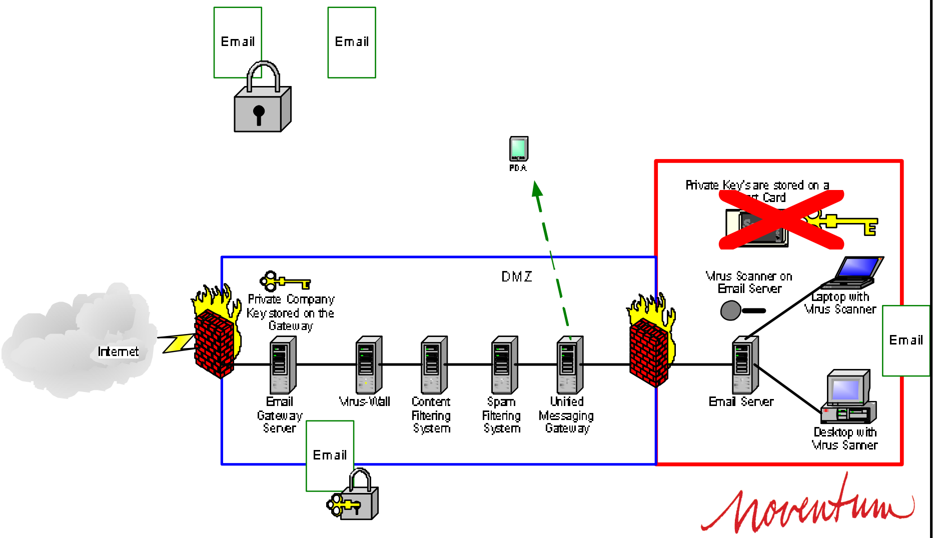
Virtual Post Office – Solution B (3/3)

- **Advantages**
  - Virus scanning and Content/Spam filtering is possible
  - Two-level virus scanning concept can be realized
  - Three-level virus scanning concept (unencrypted email forwarding) can be realized
  - Unified Messaging Solutions will be supported
  - Representative regulation can be realized.
- **Disadvantages**
  - Storage of the private keys at central point –> attack point.
  - Use of on Smart Cards / USB Token generated and stored private keys is not possible (not selection).
  - Sender and colleagues should be informed about the use of the technology.
  - Each user needs at least one X.509 Certificate
  - Roll out of the interested partner CA certificates necessary
  - Distribution of the directory configuration information of the other interested firms necessary
  - Gateway is necessary - investment

Virtual Post Office – Solution C (1/3)

- **Functional method**
  - Sender encrypts the email with a company certificate of the receiver.
  - Encrypted emails will decrypt at the gateway.
  - Than the email can be scanned for Viruses and the Content can be filtered
  - If the email is ok than the Gateway forwards the decrypted Email to the email server
  - A centralized or decentralized email encryption and/or signing is possible.
  - At the gateway can be defined an extensive control device for the email intercourse (encryption, signing, removing of signatures, validation of signatures, etc.)

Virtual Post Office – Solution C (2/3)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Virus-Wall
Content Filtering System
Spam Filtering System
Unified Messaging Gateway
Email Server
Desktop with Virus Sanner
Email

Virtual Post Office – Solution C (3/3)

- **Advantages**
  - Virus scanning and Content/Spam filtering is possible
  - Three-level virus scanning concept (unencrypted email forwarding) can be realized
  - Unified Messaging Solutions will be supported
  - Representative regulation can be realized.
  - Definition of an extensive control device is possible.
  - Only a company certificate necessarily.
  - All outgoing emails can signed with a company signature.
  - Central administration point for partner CA certificates.

- **Disadvantages**
  - Use of on Smart Cards / USB Token generated and stored private keys for email encryption is not possible.
  - Between gateway and email server and between email server and desktop all email will transmitted unencrypted.
  - Problems in the addressing of email at the receiver are well known.
  - Gateway is necessary - investment

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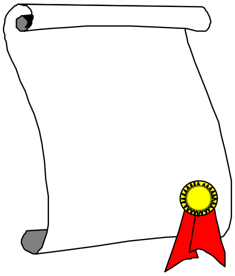
Common Practices

Addressing the

- **Legal,**
- **Political and**
- **Business issues**

are just as important for success as the technical solution.



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Best Practices

- **How do we know that the public key actually belongs to the intended recipient?**

  Certificate Policies

  Certification Practice Statement

- **How do we know that the recipient will safeguard the infrastructure and their encrypted documents?**

  Relying Party Agreement

- **Many companies have thousands of trading partners -> with millions of possible combinations of bi-lateral agreements**

  Multi-lateral Agreements and acceptance of Best Practices

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Summary

- All Virtual Post Office Solutions use the Secure Messaging Challenge Standards.
  - LDAPv3
  - X.509v3
  - S/MIME
- Spam and Content filtering can be realized.
- The use of more level Virus scanning solution is possible.
- There is a solution for (almost) each business case.
- The view of the organization and the legal aspects are for the successful, durable utilization of decisive importance.

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"One thing is sure nothing is sure
but nothing is not always sure."

Joachim Ringelnatz

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