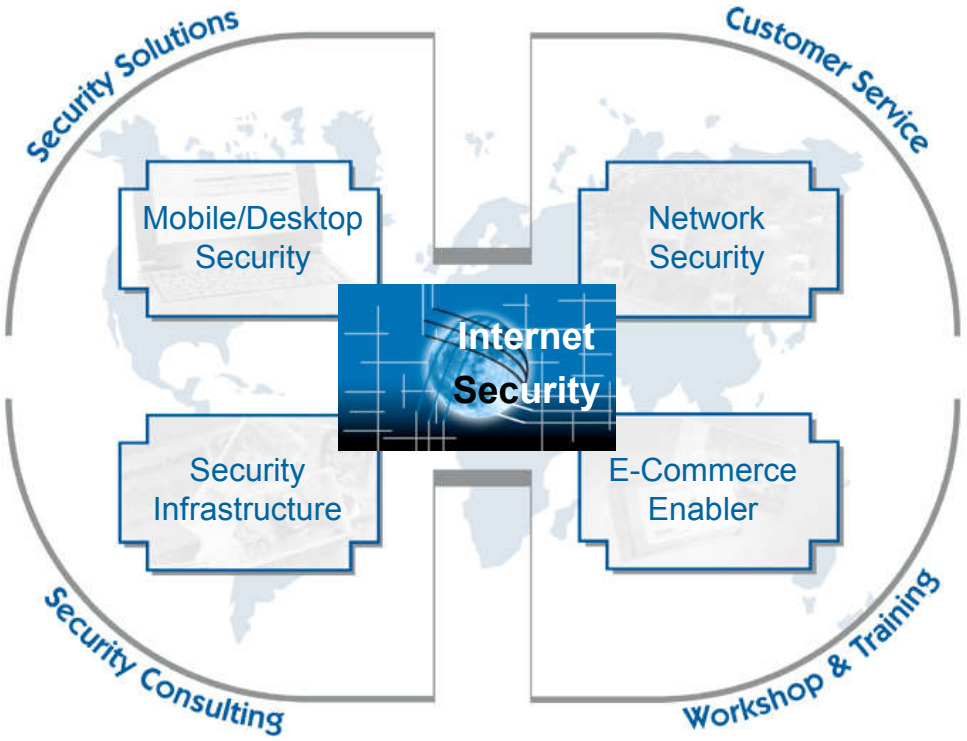
Secure E-Mail Communication in Organisations



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Why do we need Security?

- Changes in (e-)business process
  - Information society
- Assets are available as bits and bytes (e-@ssets)
- Hackers are forcing us to protect our information
  - Hacking is considered as „sport“
  - No moral
- Data has become the most important economic good
  - This means increasing vulnerability of companies
  - Economic espionage is very lucrative

e-@ssets

E-Mail: Chances & Risks

- E-mail is the most frequently used application on the Internet
- Offers fast exchange of information for the communication partners without changing media
- Information via e-mail and their attachment could represent several mio.$
  - drafts of agreements
  - business transactions
  - merges
- Risk: information is send in plaintext

Do you know Bad Aibling?

- Bad Aibling:

- 50 km south east of Munich
- Health resort with 16.000 inhabitants
- nice view on the Tölzer mountains and the river Inn
- oldest Bavarian health resort for mud-baths

http://www.kur-online.de/indxd.htm

Do you know Bad Aibling?

- Bad Aibling:
- US Air force territory with interception station, reporting to the NSA

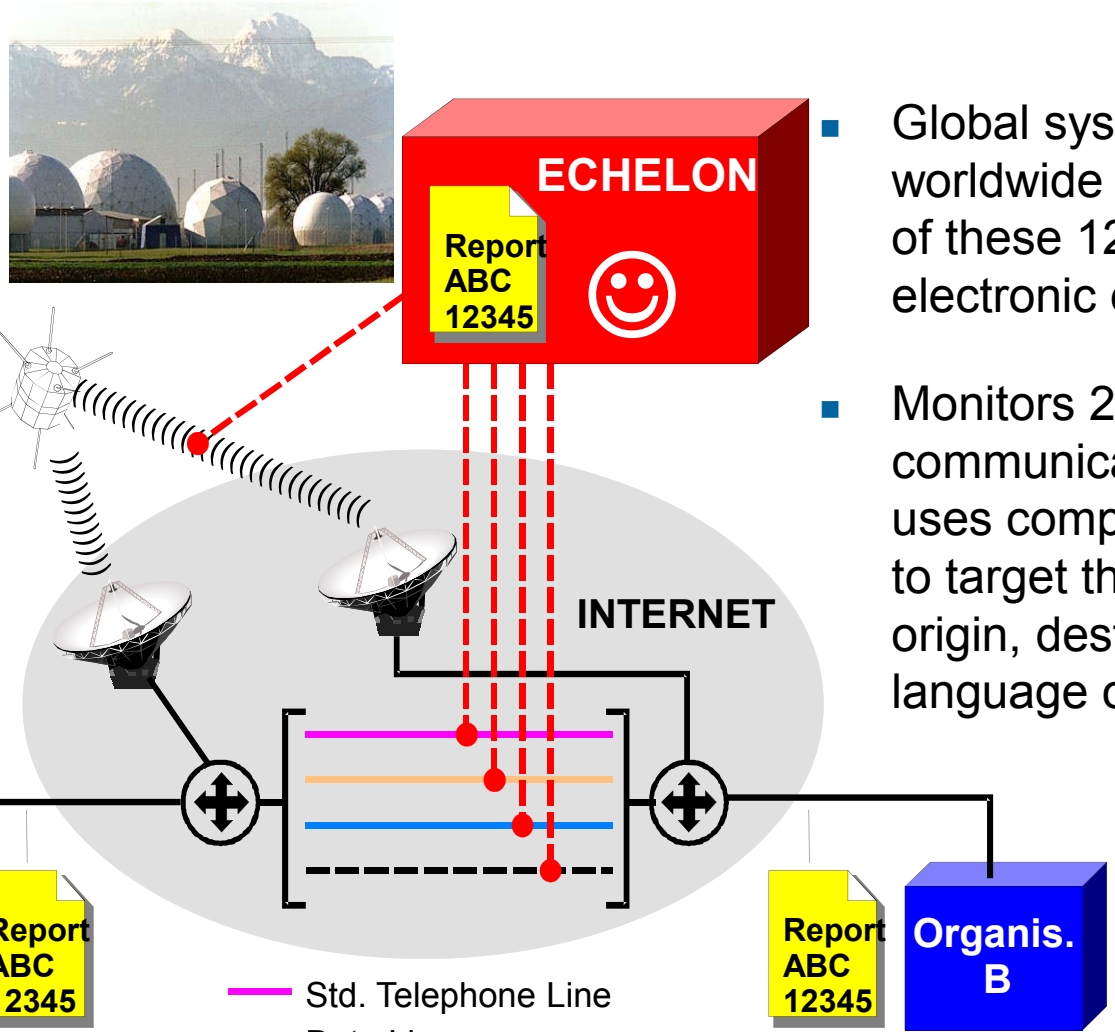
- Task of the National Security Agency: Interception and decoding of all kinds of foreign communication, which might be of interest for US security

- budget six times higher than the CIA‘s
- the world biggest employer of mathematicans

http://www.aib.de

- The „war of information“ is still on, even if you don´t see it!

ECHELON



- Global system with worldwide stations (among of these 120 satellites) for electronic eavesdropping
- Monitors 2.000.000 communications per hour, uses computerised systems to target those of interest by origin, destination, language or key words

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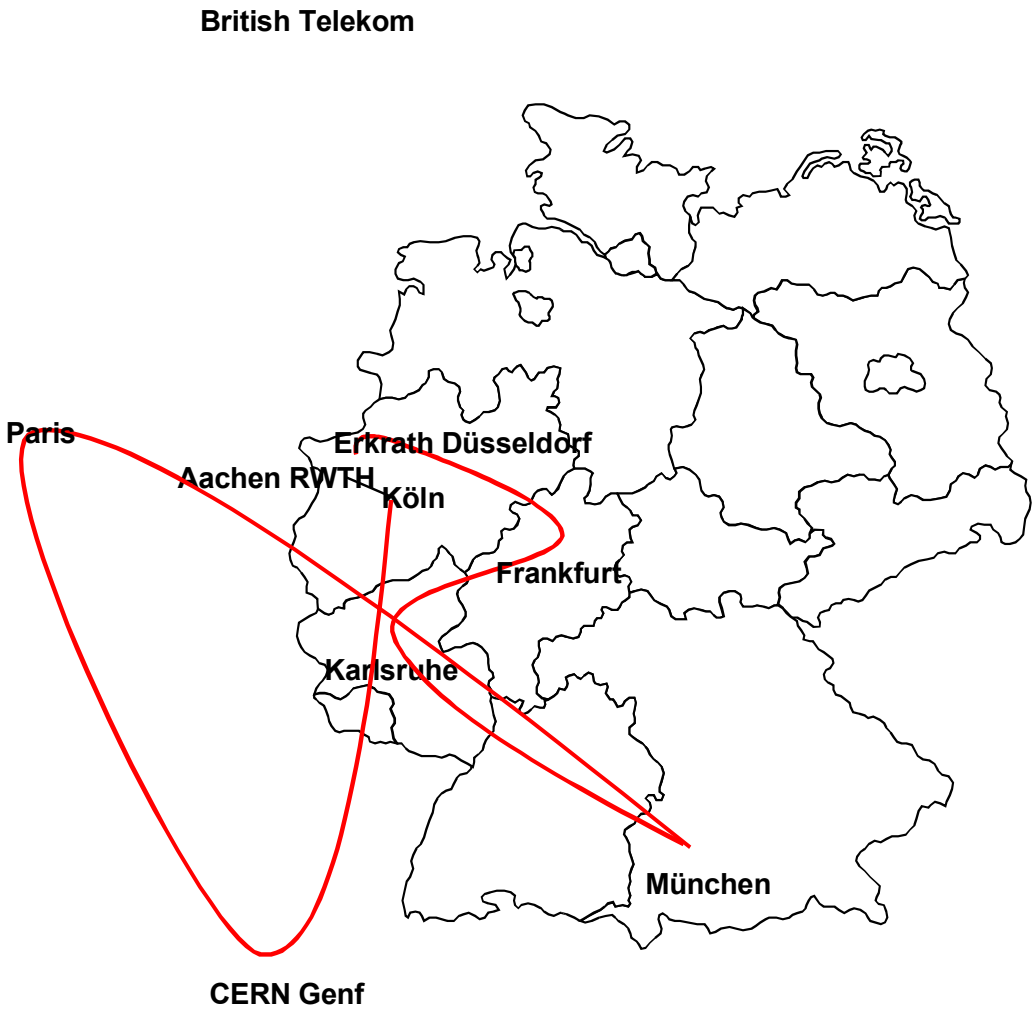
Path of an E-Mail



scratch

1. Router.KryptoKom.de
2. local.aachen.core.csl-gmbh.net
3. local2.erkrath.core.csl-gmbh.net
4. xip2.erkrath.core.csl-gmbh.net
5. cisco.csl-gmbh.net
6. frankfurt.core.xlink.net
7. langen.core.xlink.net
8. karlsruhe.core.xlink.net
9. muenchen.core.xlink.net
10. Munich-EBS.EBONE.NET
11. Paris-EBS2.EBONE.NET
12. Cern-EBS1.Ebone.NET
13. CH-s2.dante.bt.net
14. Ch-f0-0.eurocore.bt.net
15. DE-s1-0.eurocore.bt.net
16. De-f0-dante.bt.net
17. ipgate2.win-ip.dfn.de
18. ipgate21.win-ip.dfn.de
19. ZR-Koeln1.WiN-IP.DFN.DE
20. RWTH-Achen1.WiN-IP.DFN.DE
21. cisco-bwin.rz.rwth-aachen.de
22. informat-05.rz.RWTH-Aachen.DE
23. terpi.Informatik.RWTH-Achen.DE

E-Mail Communication: Risks

- Monitoring of e-mail in plaintext
- Smuggling in of non-authentic information
- Tampering with data
- Interruption of message flow
- Recognition of message flow

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Basics of E-Mail-Security

Confidentiality	• encryption • access and rights control
Integrity	• digital signature • check sum
Authenticity	• encryption • user login • certificates
Reliability	• digital signature • certificates • timestamp
Availability	• hardware mirroring • backup of data

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Conceptional E-Mail Security

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Security Policy (1)

- **Analysis of communication structures**
  - Partner for e-mail communication
  - Analysis of need for secure E-Mail communication
  - Wishes of and influence on partners

- **Analysis of need for protection**
  - Definition of security classes with regard to
    - Confidentiality
    - Integrity
    - Authenticity

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Examples of security classes with regard to confidentiality

Security class	Applies if	example
"low" damage potential	• Available for all • Controlled distribution • Easy to recover in case of loss	• Internal directories and rules • Statistics without strategic and data protection meaning • Company data /data for the public
"middle" damage potential	• Damage is restricted to responsibility of one organisational unit (not within the whole organisation) • General rule for customers and employees	• Data within one part of the organisation (personal data, customer data, etc.) • Host data on PCs (File-Transfer)
"high" damage potential	• Influence on all parts of the organisation • Damage to all parts of the organisation (image, etc.)	• Strategic information and financial data • Confidential personal data or customer data • agreements

Security policy (2)

- Extention of rules and regulations regarding the e-mail use for confidential documents and data
- Set-up of guidelines for e-mail exchange with regard to security classes:

Security class (damage potential)	Sending via E-Mail
„low	Possible, no encryption
„medium“	Possible, but encryption requiered
„high	Possible, but encryption requiered **Alternatively** No exchange via e-mail

Security policy (3)

- Developing a information recovery concept (message recovery, key recovery)
- User trainings
- operation instructions/ guide lines
  - handling of encryption and digital signature
  - key handling
  - case of emergency

Public Key Infrastructure

- **Policy**
  - security concepts
  - user guidelines
  - operation instruction / tasks
- **RA - Registration Authority**
  - identification (incl. registration) according to policy
- **CA - Certification Authority**
  - key generation for certification authorities
  - certification for public keys
  - personalisation of transport media for certificates, key pair etc.
  - time stamp services
  - optional generation of keys for users
- **DIR - Directory Services**
- **PKI enabled application**
  - E-mail
  - ...

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Current Standards

- **Exchange format**
  - PGP
  - S/MIME
- **Certification format**
  - X.509 Version 3
- **revocation lists**
  - X.509 CRL Version 2
- **directory service**
  - LDAP Version 3

PKI-interfaces

PKIX-protocol

Token

PKCS#11

programming interface (smartcards, ...)

PKCS#12

standards for storing private keys, certificates, user information

PKCS#13

elliptic curves encryption standard (RSA)

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Decision Criteria for Product Choice (1)

- **Security**
  - strong encyption
    (symmetric > **112 Bit**,
    asymmetric 768, **1024**, 2048, ... **Bit**)
  - recognized standards instead of depending on one vendors
  - danger of trap doors in software
- **Availability**
  - legal permission of local applications (export or import rights)
- **Reliability**
  - independent tests
  - established, commercial products

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Decision Criteria for Product Choice(2)

- **Software-Ergonomcs**
  - easy to learn
  - simple, intuitive handling in accordance with standards
  - easy to integrate in e-Mail products
    (i.e. MS Outlook, Lotus Notes, Groupwise, ...)
  - encryption/signature speed
- **Key / certificate management**
  - X.509-certificate
  - SmartCards
  - LDAP-binding
- **Interoperability**
  - „Inhomogenity“ of communicating parties

Decision Criteria for Product Choice(3)

- **Software-Maintenance-Concepts**
  - updates (extra costs?)
  - expenditure for client updates
- **Costs**
  - investments
    - hardware
    - software
    - installation
    - trainings
  - running costs
    - administration
    - maintenance

Infrastructure

PKI

- Certificate
- Secret Key

Smartcard reader

- CardMan Family

SPM

- Security Policy Manager

Security solutions for our customer

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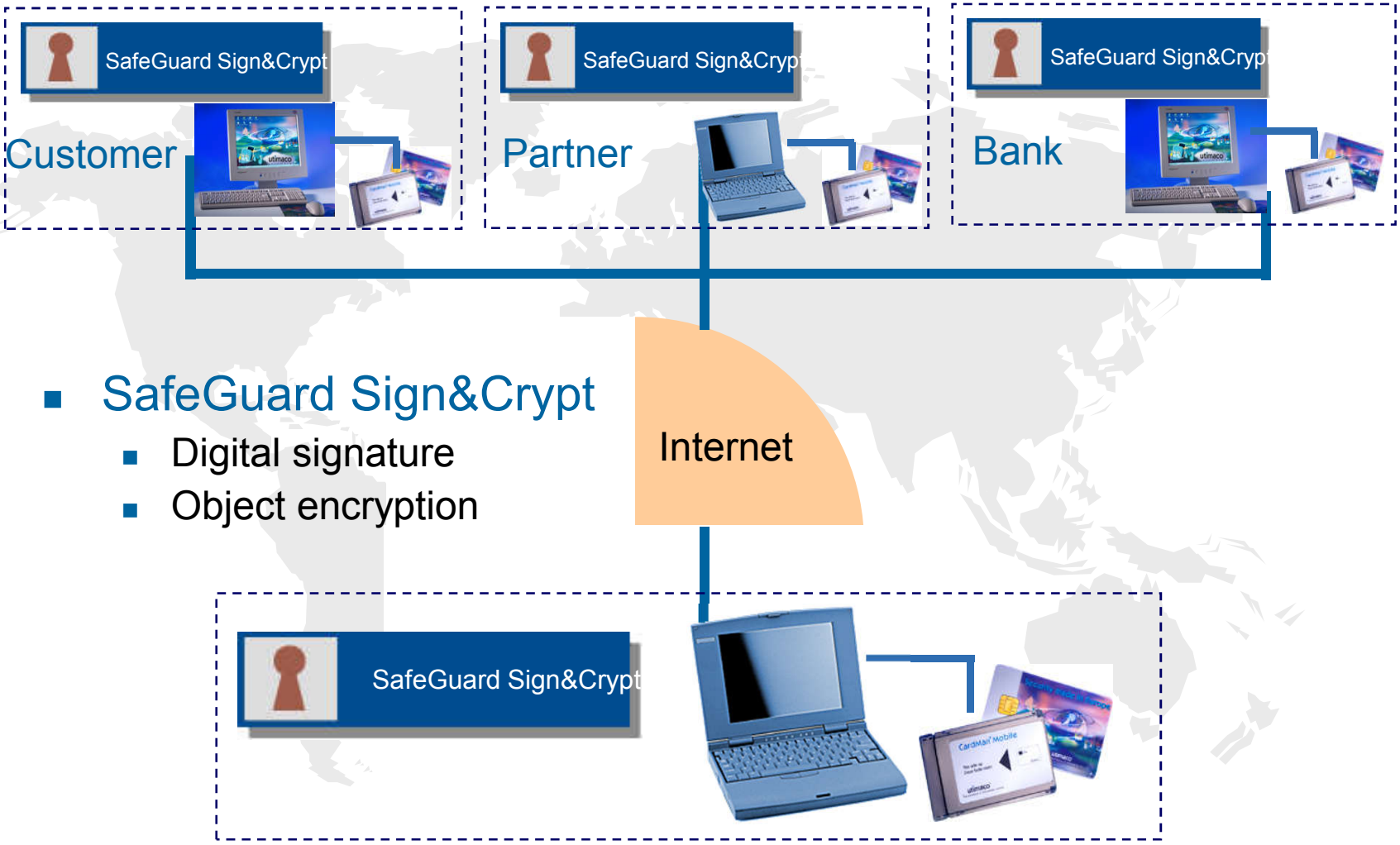
Digital Signature & E-Mail Security



- SafeGuard Sign&Crypt
  - Digital signature
  - Object encryption

Security solutions for our customer

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User Awareness

- Approx. 45 % of all computer breakdowns are caused by users, their mistakes in operating or carelessness (KES 1998)
- User Trainings
  - product related trainings
  - realizing the security policy
  - awareness
- User with awareness
  - comprehend information and IT-systems as a value which needs to be protected
  - understands IT-security as a part of his task/duty and as a quality feature

Measure catalog for e-Mail security in enterprises

time

- Setting up an internal help-office
- Establish backup-processes
- User trainings
- Step-by-step concept for installation (Roll-Out)
- Training for security administrators
- Establish a useful PKI
- Product choice
- Developing a security policy

E-Mail-security - without compromises!

„You have to protect your data
from your little sister or the secret service,
everything in between doesn‘t make sense.“

Bruce Schneier

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