EMail Privacy Efforts

(ignoring secure sms/chat/im/social/...)

D. Crocker

Brandenburg InternetWorking

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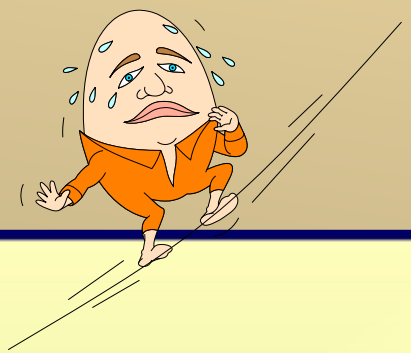
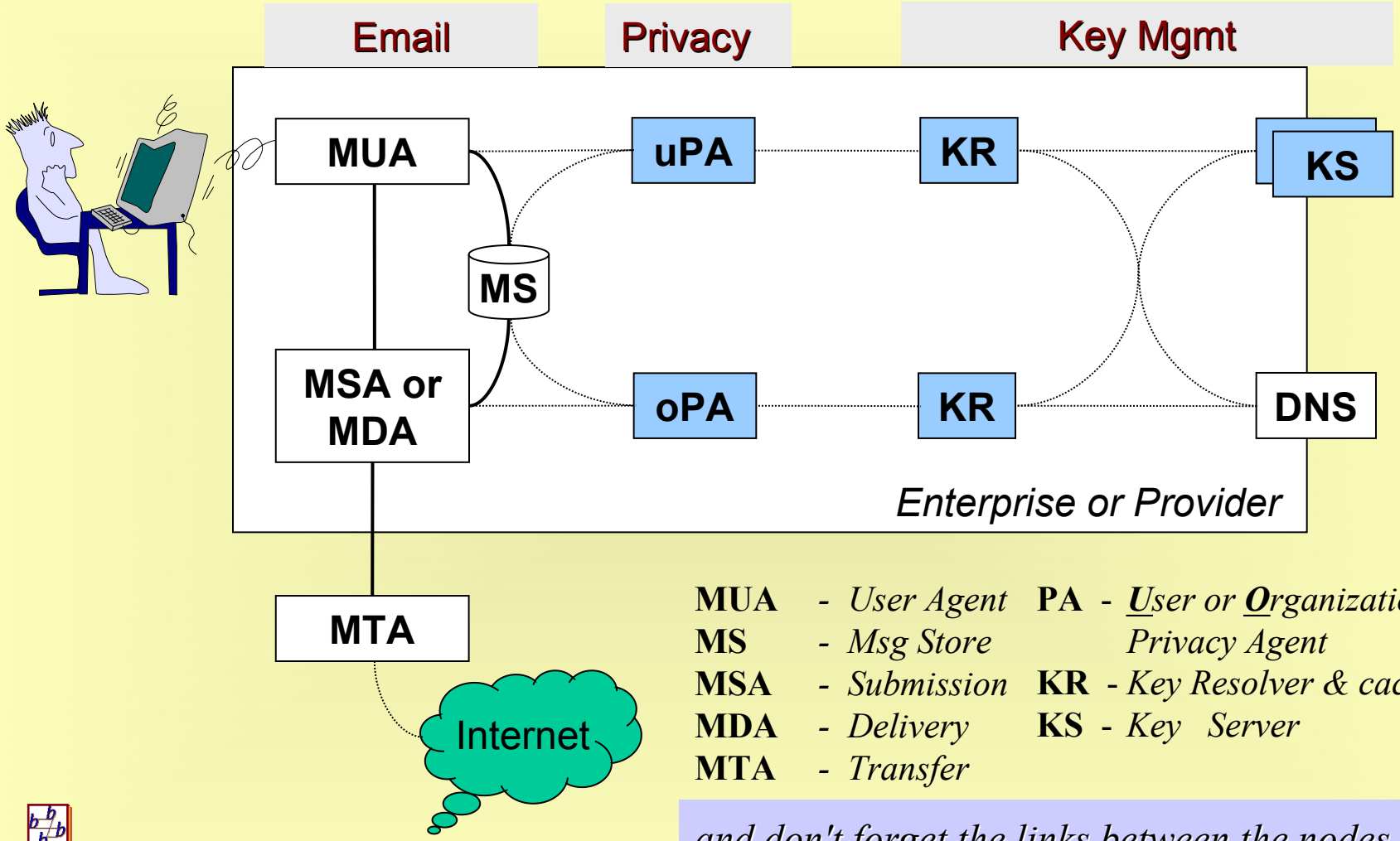
Threats



- **Author spoofing**
  - Is purported creator/submitter of message is the actual?
- **Service provider spoofing**
  - Is intended provider (mail, key, DNS) is the actual provider?
- **Message content disclosure**
  - Limit disclosure only to authorized parties -- recipients
- **Message structure disclosure**
- **Metadata disclosure**
  - Participant & message attributes, permitting social and network traffic analyses; relationships and activity

Basic Email Privacy Components

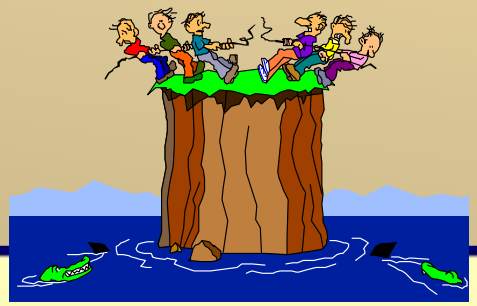


MUA - *User Agent*
MS - *Msg Store*
MSA - *Submission*
MDA - *Delivery*
MTA - *Transfer*

PA - ***U**ser or **O**rganization Privacy Agent*
KR - *Key Resolver & cache*
KS - *Key Server*

and don't forget the links between the nodes...

Vectors



- Password to account
- Key for signing/encryption
- Certificate with key and attributes
- Key server
- Advanced Persistent Threats (APT)
- DNS and Domain Names
- Transmission Channel
- Mail Server
- Client

Who *must* you trust?
Who *do* you trust?
And with what?

TLS is good hygiene, but...

- **CA-based enforcement is lagging**
  - with 'opportunistic' meaning open to MITM
- **Leaves intermediaries vulnerable**
- **So what about...**
  - End-to-end protection that really is end-to-end?
  - ***Wrap the message, not the channel!***

Long-Term Poor Adoption

- **Email content (body) encryption**
  - PGP
  - S/MIME
- **Barriers are systems-level, not crypto**
  - Key management ***at scale***
  - User (and operator) ***usability*** limitations
- **Popular topic now, for some reason**
  - 100+ efforts around 'messaging', maybe 25+ for email

https://github.com/OpenTechFund/secure-email

http://cups.cs.cmu.edu/soups/2014/workshops/effcup.html

(Some) Current Projects

- **Web Mail**
  - Lavaboom
  - Mega
  - PrivateSky
  - ProtonMail
  - Scramble
  - Startmail
  - Whiteout
- **Browser Extensions**
  - Mailvelope
  - End-to-End
- **Self-Hosted Email**
  - Dark Mail Alliance
  - FreedomBox
  - Mailpile
  - Mail-in-a-box
  - kinko

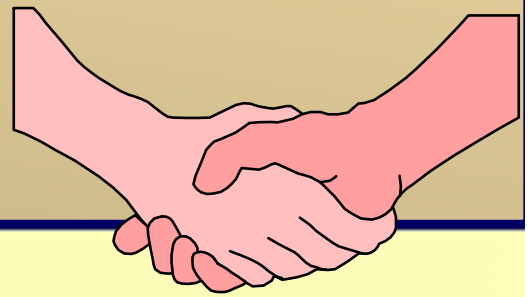
(Some) Current Projects

- **Mail Clients**
  - Bitmail
  - Mailpile
  - Parley
- **Email Infrastructure**
  - Dark Mail Alliance
  - LEAP Encryption Access Project
- **Post-email alternatives**
  - Bitmessage
  - Bote mail
  - Cables
  - Dark Mail Alliance
  - Enigmabox
  - FlowingMail
  - Goldbug
  - Pond

Basic Email Message Components

- **Envelope** *(rcpt-to, mail-from)*
  - Difficult to deliver if dest address not in the clear...
- **Header**
  - User *(to, from, cc, date, subject...)*
  - Ops *(received, return-path...)*
- **Content**
  - Body - Attachments
  - Body - Structure

Key Management



- Assignment
- Discovery
- Validation
- Availability
- Revocation
- Rollover

Example work

- **Walled garden**
  - Product / Service
  - Address book vs. transport
  - E2E protection
- **Better**
  - Crypto (OTR, PFS, ...)
  - Cert mgmt (Revocation, structure, TOFU, Bitcoin clone-ish...)
  - Packaging (TOR-ish)
- **Usability**
  - Automatic key mgmt
  - Automatic key use
  - Safety flags & signals
- **Storage**
  - Encrypted
- **P2P exchanges**
  - Key 'invitation'
  - Transport
- **Replace**
  - Certs (DNSChain,...)
  - Transport (eg, TOR)
  - SMTP
- **OpenPGP**
  - Integration
  - Facilitation
  - Turnkey & sanitized