Email Security and Best Practices

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Why your email setup is critical

- Billions of SPAM emails are generated every day
- The tips here can help you to reduced the chances of you receiving SPAM email or inadvertently being the source of SPAM emails
- Because email is so efficient, its now used to send malware, ransomware, worms etc.
  - For example: WannaCrypt!

Security

- Run secure pages from the mail server and secure SMTP to clients
  - Secure Webmail – port 443
  - Secure SMTP – port 465/587
- Force clients to use secure IMAP or Secure POP
  - Secure POP – port 995
  - Secure IMAP – port 993
- Require authentication on your mail server before a mail enters the queue from a sending client aka SMTP AUTH
- Lock down your box and block all unnecessary ports

User Training is important

- Innocent actions by your users may trigger anti-spam rules
  - Adding tens of email addresses in the “TO” field when composing email
  - Adding Subject with ALL CAPS IN THE SUBJECT
  - Attaching files with different extensions
    - “ImportantContract.PDF.Docx”
- Opening Phishing emails that contain trick subject lines like “Your inbox is full” or “Attention your email is compromised”

SPF – Sender Policy Framework

- SPF – Sender Policy Framework
  - SPF allows administrators to specify which hosts are allowed to send mail from a given domain by creating a specific SPF record (or TXT record) in the Domain Name System (DNS).
- *@ IN TXT "v=spf1 include:gmail.com ip4:1.2.3.4 mx -all"*
- The above will only allow mail from IP 1.2.3.4 and any server in the domain with an MX record
- If not sure use a generation tool online
  - http://www.mtgsy.net/dns/spfwizard.php

Domain Keys Identified Mail (DKIM)

- DKIM (DomainKeys Identified Mail) is an authentication mechanism to help protect both email receivers and email senders from forged and phishing email.
- It is intended to prevent forged sender addresses in emails, a technique often used in phishing and email spam.
- DKIM allows the receiver to check that an email claimed to come from a specific domain was indeed authorized by the owner of that domain which is done using cryptographic authentication.
- Verification is carried out using the signer's public key published in the DNS. A valid signature guarantees that some parts of the email (possibly including attachments) have not been modified since the signature was affixed

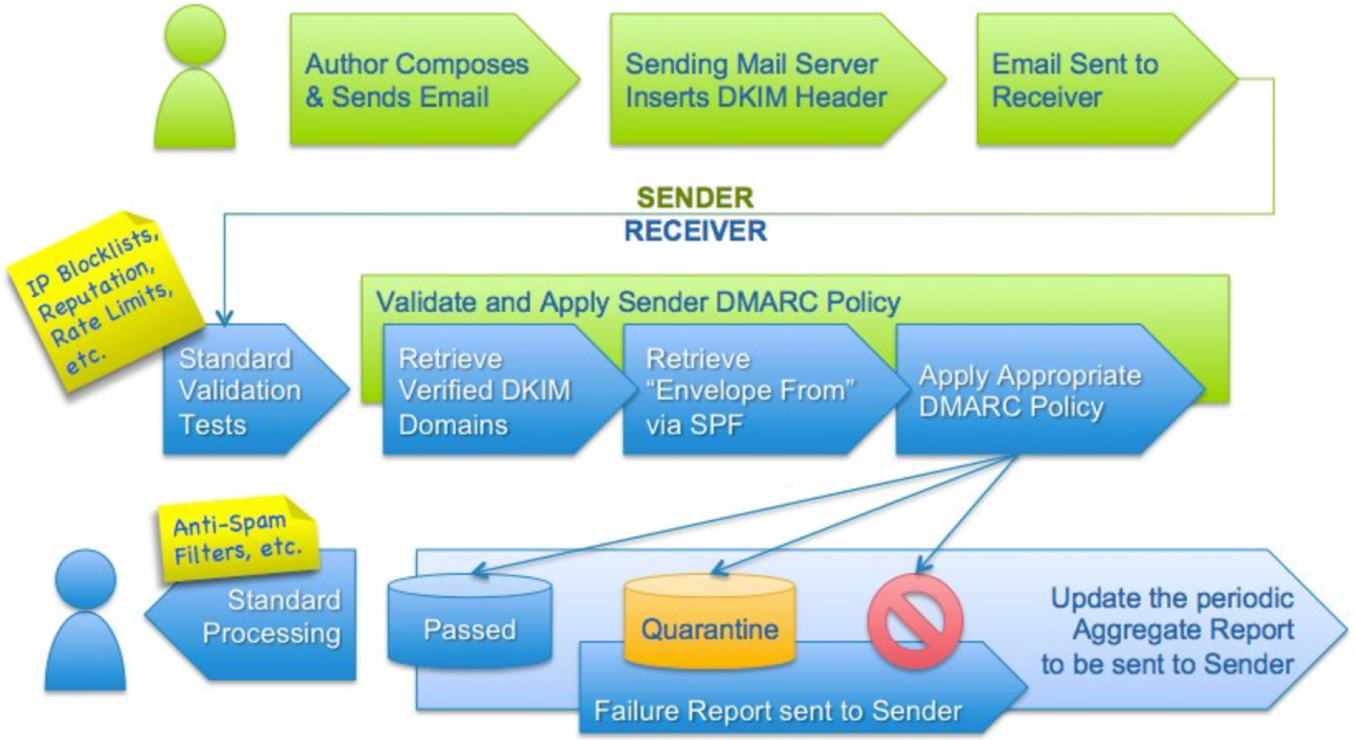
DMARC -

- which stands for “Domain-based Message Authentication, Reporting & Conformance
- It builds on the widely deployed SPF and DKIM protocols, adding linkage to the author (“From:”) domain name, published policies for recipient handling of authentication failures
- Another IETF standard designed to combat growing spam
- More at http://dmarc.org

Why is DMARC important

- Allows Domain owners to:
  - Signal that they are using email authentication (SPF, DKIM)
  - Provide an email address to gather feedback about messages using their domain – legitimate or not
  - A policy to apply to messages that fail authentication (report, quarantine, reject)
- Allow Email receivers to:
  - Be certain a given sending domain is using email authentication
  - Consistently evaluate SPF and DKIM along with what the end user sees in their inbox
  - Determine the domain owner's preference (report, quarantine or reject) for messages that do not pass authentication checks
  - Provide the domain owner with feedback about messages using their domain

DMARC FlowChart



https://dmarc.org/overview/

SPF, DKIM and DMARC

- All published in DNS!
- SPF sample: $dig TXT facebook.com
  “v=spf1 redirect=_spf.facebook.com”
- DKIM sample: *$*dig google._domainkey.protodave.com TXT
  google._domainkey.protodave.com. 3600 IN TXT "v=DKIM1\; k=rsa\; p=MIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAhArxYH88+A76Gk7/8ENefN5RhMFhoYJp8T3KLPYY pejDI45PKWTO+2r8ZJZOtuk7tsG07bmJyU8PFvU48Lf1xtb4WcFxKKjd7N5MF6JcHD51Xb8XDAJA2ldqxH4hBbw9 dRjsT7WBFXbp2x6MSWxgi9f1w+7Z2IFG+AtUjrf8/9N3gLieaZKZT1SEhR8TnhfOm" "FG0LfMyS0YtfHKrkUkBCEmWBPisB2CcZBShKr6/T8/UB/oZF8XMRd0NOsru9MGx9Yp89jIYS5YRuvbA0/TLgOOi qrSU5Ms1egMwfFyy4BMDUKayZzF6BxNPc/+UoFrYHKRZpyD/kEd4FXNEddlksQIDAQAB”
- DMARC sample: dig TXT _dmarc.google.com
  "v=DMARC1;p=reject;pct=100;rua=mailto:postmaster@dmarcdomain.com”

DANE – Encrypting email transfer from sender to recipient

- DNS-based Authentication of Named Entities
- Described in RFC 6698 and proposed as way to authenticated TLS certificates to be bound to DNS using DNSSEC
- Having a DANE Record indicates that a sender of an email must use encryption (TLS) to transmit the email from the sending server to the recipient email
- Using DANE therefore will ensure that the email sent to you was transmitted over TLS (encrypted) and so its much more difficult for an eaves dropper to read your email
- Without DANE, email uses opportunistic encryption to secure SMTP – ie it will be used if available

Reverse Records

- Have reverse records (PTR) for your mail server so that it is resolvable from the IP
- Mandatory by most servers these days
- Used to verify authenticity of the sending mail server
- The IP Address must resolve back to the mail server name
- You can have multiple reverse records
- You can have an SPF record that states that any IP that has a reverse record can send email from your domain
- *IN TXT “v=spf1 ptr:domain.co.tz ip4:1.2.3.4 mx -all”*

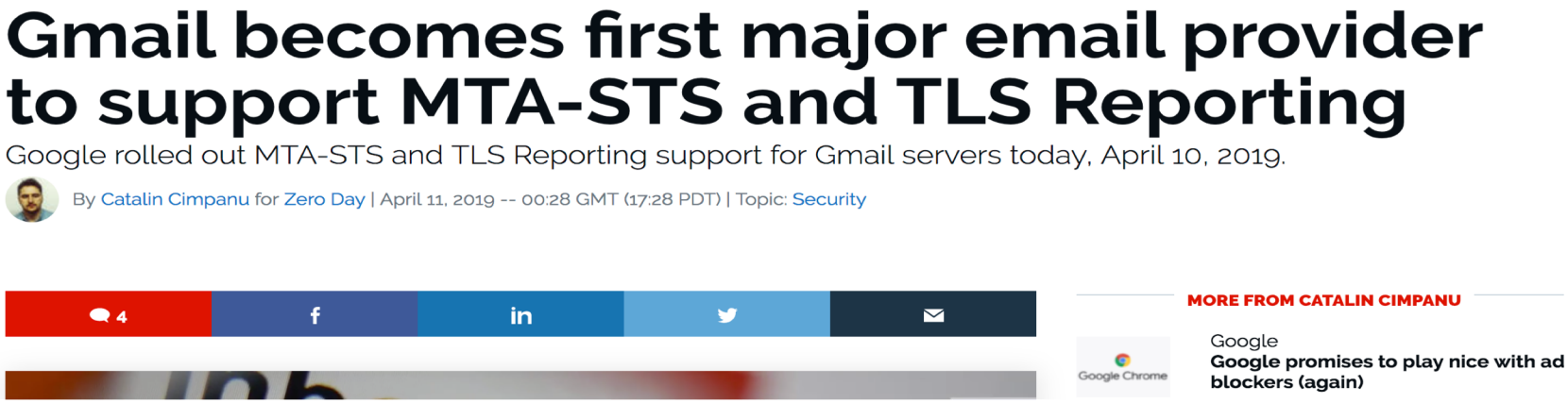
What to use to secure email transport?

- Many upcoming protocols and methods to secure email
  - MTA-STS - SMTP MTA Strict Transport Security
    - https://tools.ietf.org/html/rfc8461
    - https://www.uriports.com/blog/mta-sts-explained/
  - ARC – Authenticated Received Chain
    - https://en.wikipedia.org/wiki/Authenticated_Received_Chain
- DKIM and DMARC have been around for sometime but not widely used. Keeping up with all these solutions is challenging
  - Needs lots of testing before implementation or you break your email
  - DANE and MTA-STS are similar. Do you need to implement both?

Summary of DKIM, DMARC, SPF, ARC, DANE, PTR…

- As a receiver of my email, you can accept it because:
  - I have told you which servers I control – SPF Record
  - My email server has signed the email – DKIM
  - My server's signature can be verified using DNS servers I have configured – DMARC or ARC
  - My email client signed the email with a PGP key
  - My servers have verifiable PTR records
- As a recipient of your email, I can guarantee you that your email was sent to me over a secure channel because
  - DANE – my server only accepts securely sent email and used DNSSEC infrastructure to validate my authenticity
  - MTA-STS – my server only accepts securely sent email and used a Certificate Authority to validate my authenticity

This is too much for me! Outsource my email?



Gmail becomes first major email provider to support MTA-STS and TLS Reporting

Google rolled out MTA-STS and TLS Reporting support for Gmail servers today, April 10, 2019.

By Catalin Cimpanu for Zero Day | April 11, 2019 -- 00:28 GMT (17:28 PDT) | Topic: Security

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MORE FROM CATALIN CIMPANU

Google

Google promises to play nice with ad blockers (again)

- But where is your email stored?
- Who has access to it?
- Why is it free? Is it really free??

Use Anti Spam and Anti Virus software

- Will reduce overall spam and email received
- You can also have a mail “firewall” or gateway aka Mail Filter to stop spam before it reaches your server
- Some softwares are:
  - SpamAssassin (AntiSpam) – renowned antivirus
  - Rspamd – powerful antispam Milter service
  - ClamAV (AntiVirus) – renowned antivirus
  - MailScanner and Amavisd (rely on the above)
- When setup try a penetration testing site to see how well your server can protect you from SPAM and Viruses

GreyListing

- Valid mail servers will have no problem if the receiving gives a soft error (4xx)
- They will attempt to send the mail again after some time
- Greylisting configured on a receiving mail server will give a soft error (4xx) to the sending server and store the IP/Hostname of the sending server in a file
- If the sending server returns again after some time (can be specified usually 5min) the email is accepted
- Used as a measure to deny mail from bots that are compromised to send mass mail. They often do not try again if the server did not accept the mail

Accept only well formatted messages

- Sender must be a valid name not an IP ie not user@192.14.5.6
- Mail server HELO name must be resolvable ie FQDN
- Server identification must resolve ie HELO/EHLO name must be resolveable
- Email should be from a valid email address format eg: from tom@example.com and not from tom@example

Use Blacklist databases

- Use DNSBL – DNS Based Blackhole Lists or RBL (Real Time Blackhole lists) to deny mail from well known spamming machines
- Some well known good ones are
  - SORBS – http://sorbs.net
  - SPAMHAUS – http://spamhaus.org
  - SPAMCOP – http://spamcop.net
  - MANITU – http://manitu.net

Require strong Passwords

- Advise users to use strong passwords or passphrases for their email
- Alphanumeric passwords are better than normal passwords ie combine letters with numbers
- Passphrases are even better, more difficult to break

Backup and Redundancy

- Have multiple MX records so that your server is not the only one able to receive mail for you
- Backup your mail, use tools like Rsync to copy mail to another server as often as you can
- Ensure your DNS records (MX, NS etc) are correct and test them when you complete you setup
- Use online tests like
  - http://intodns.net

The question of Ethics

- As an email administrator, its easy to view other people's email at any time with admin rights
- Emails are intended by the sender for the recipient(s) and many senders are oblivious to the fact that their email can be intercepted along the way
  - Hence the need for encryption ☺
- As an email administrator, you should be be professional and maintain ethics and etiquette ☺

References

- Wikipedia
- http://www.linuxmagic.com/best_practices
- Further reading:
  - DMARC: https://dmarc.org/
    - https://en.wikipedia.org/wiki/DMARC
  - SpamAssassin - http://spamassassin.apache.org/
  - ClamAV - https://www.clamav.net/
  - AmavisD - https://www.ijs.si/software/amavisd/
  - https://protodave.com/security/checking-your-dkim-dns-record/
  - DANE: https://en.wikipedia.org/wiki/DNS-based_Authentication_of_Named_Entities