MTA-STS and DANE

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CREATED: 2023-10-20 FRI 07:05

MTA-STS

What is MTA-STS

- Mail-Transfer-Agent Strict-Transport-Security (MTA-STS, RFC 8461 Standards Track) is an alternative approach to secure TLS connections for SMTP communication

MTA-STS idea

- A special DNS TXT record signals the existence of an TLS policy for one or more mail server for a given mail domain
    - The TLS policy is stored on an TLS secured web-server (HTTPS 1.2 or higher required)

The MTA-STS DNS TXT record

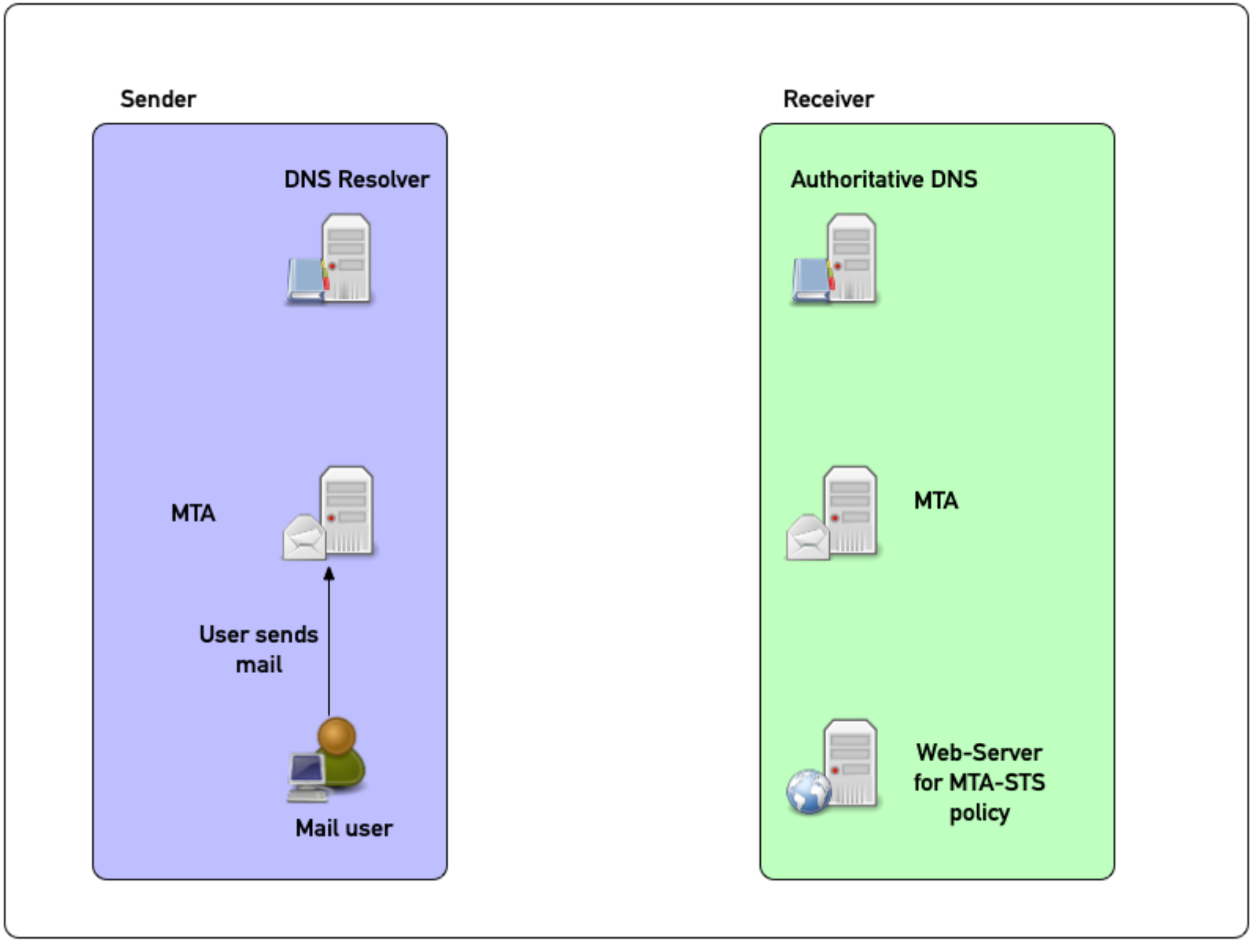
- The MTA-STS TXT record is stored with the label **`_mta-sts`** at the mail-domain for which a policy should be defined
- For the domain **`example.org`** that would be a TXT record at the domain name **`_mta-sts.example.org`**

Example of an MTA-STS record

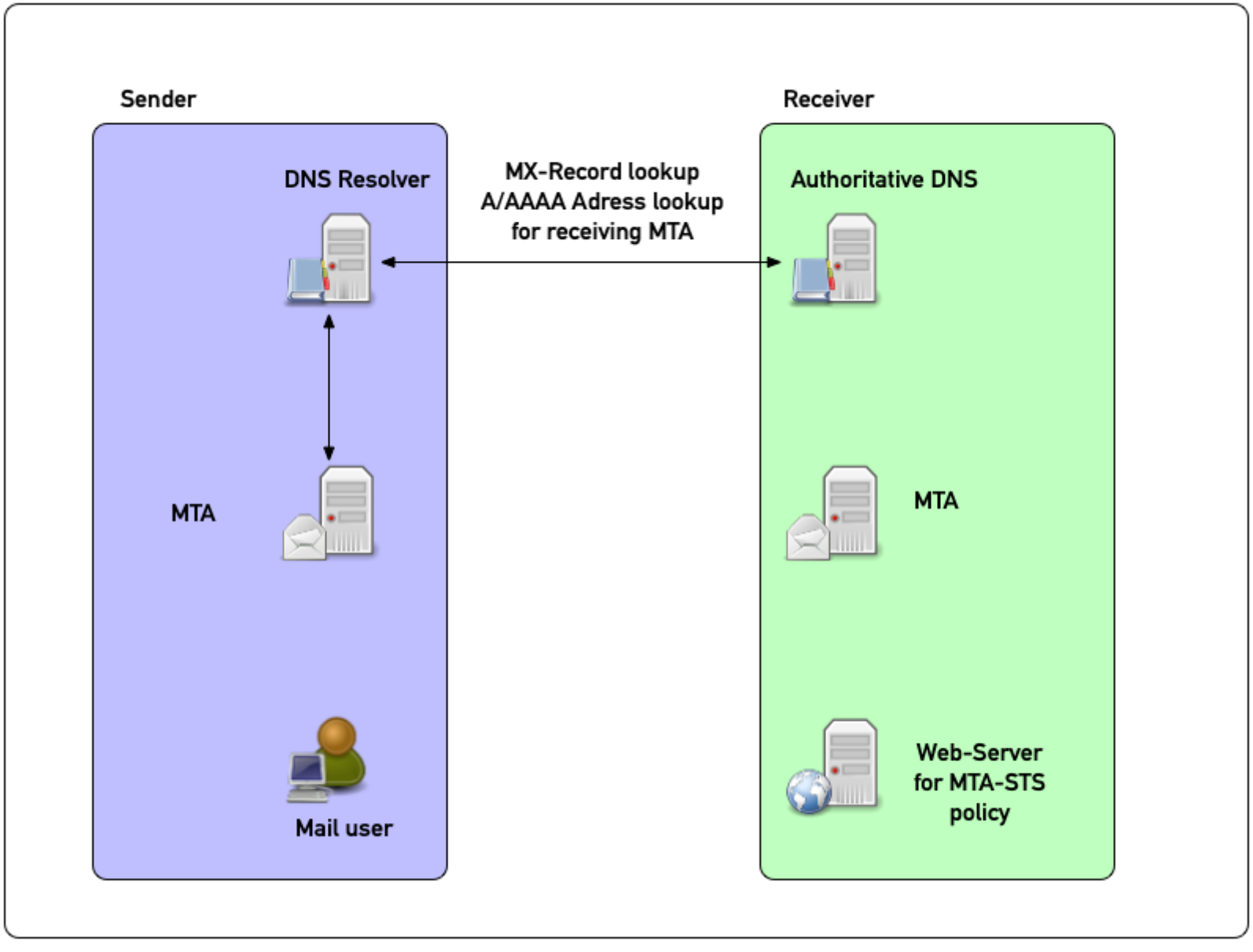
```
; <<>> DiG 9.16.44-Debian <<>> _mta-sts.microsoft.com txt
[...]
;; ANSWER SECTION:
_mta-sts.microsoft.com. 3564    IN      TXT     "v=STSv1; id=20210331000000Z;"
```

MTA-STS in pictures

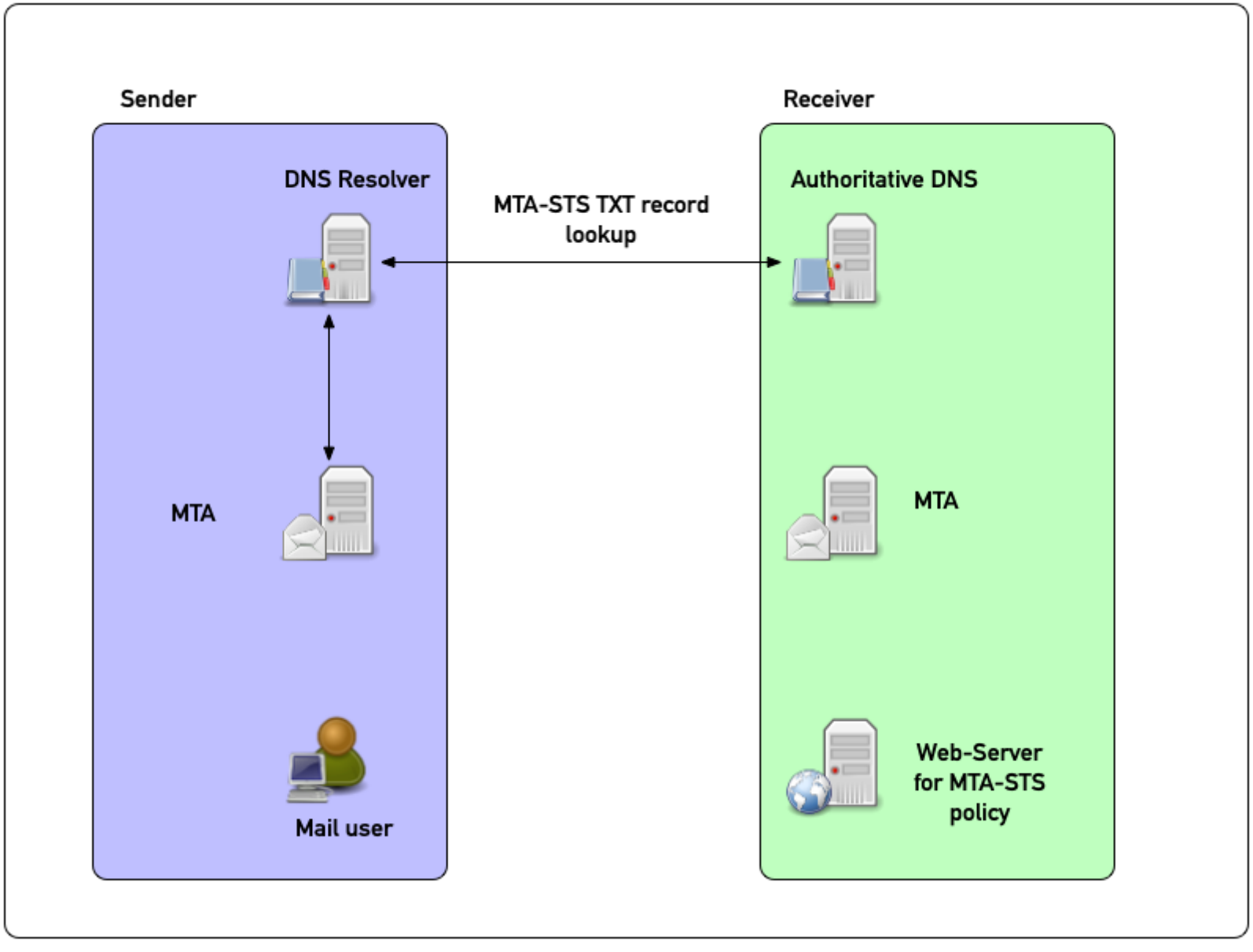
MTA-STS in pictures (1)


Sender
DNS Resolver
MTA
User sends mail
Mail user
Receiver
Authoritative DNS
MTA
Web-Server for MTA-STS policy

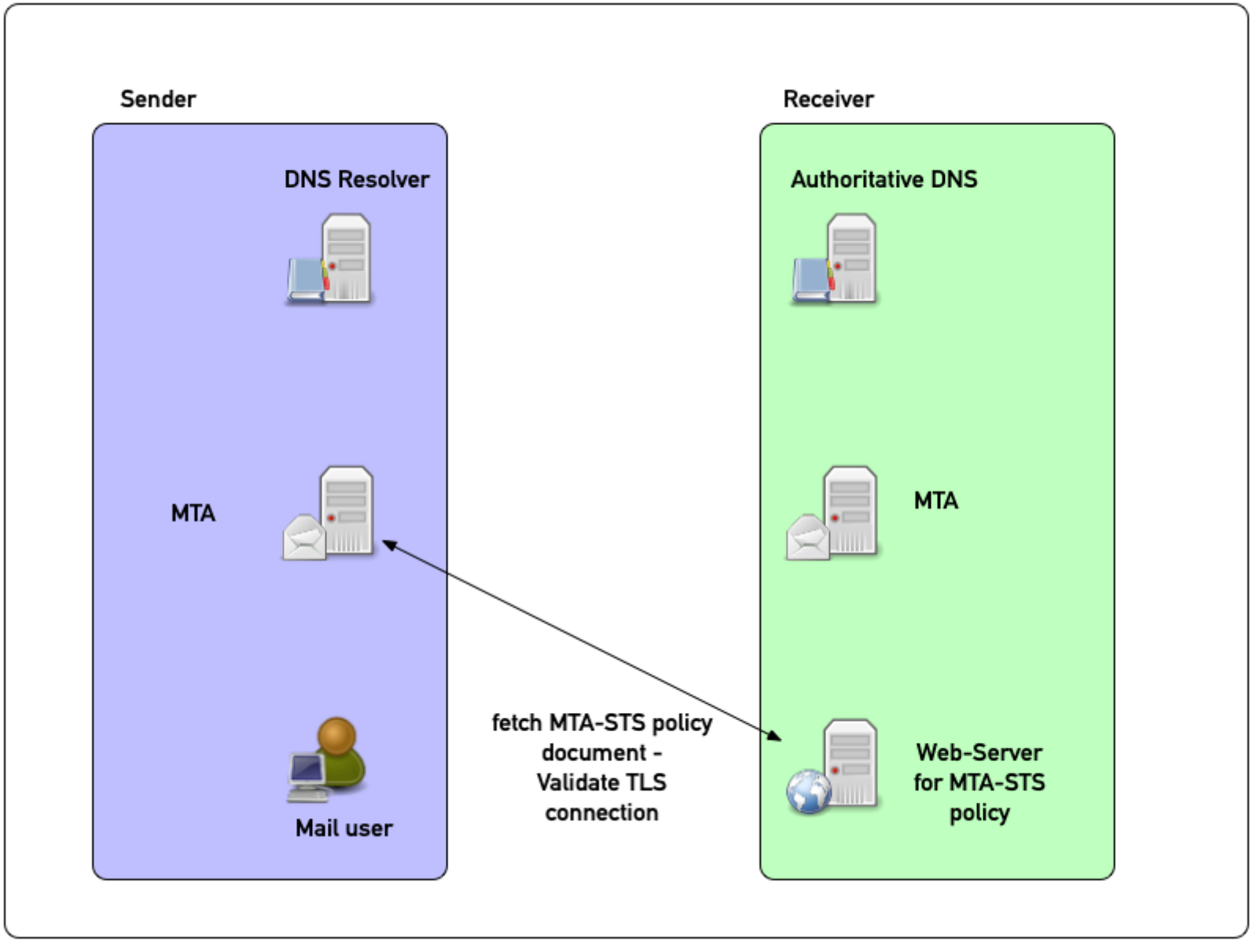
MTA-STS in pictures (2)


Sender
Receiver
DNS Resolver
MX-Record lookup
A/AAAA Adress lookup
for receiving MTA
Authoritative DNS
MTA
MTA
Mail user
Web-Server
for MTA-STS
policy

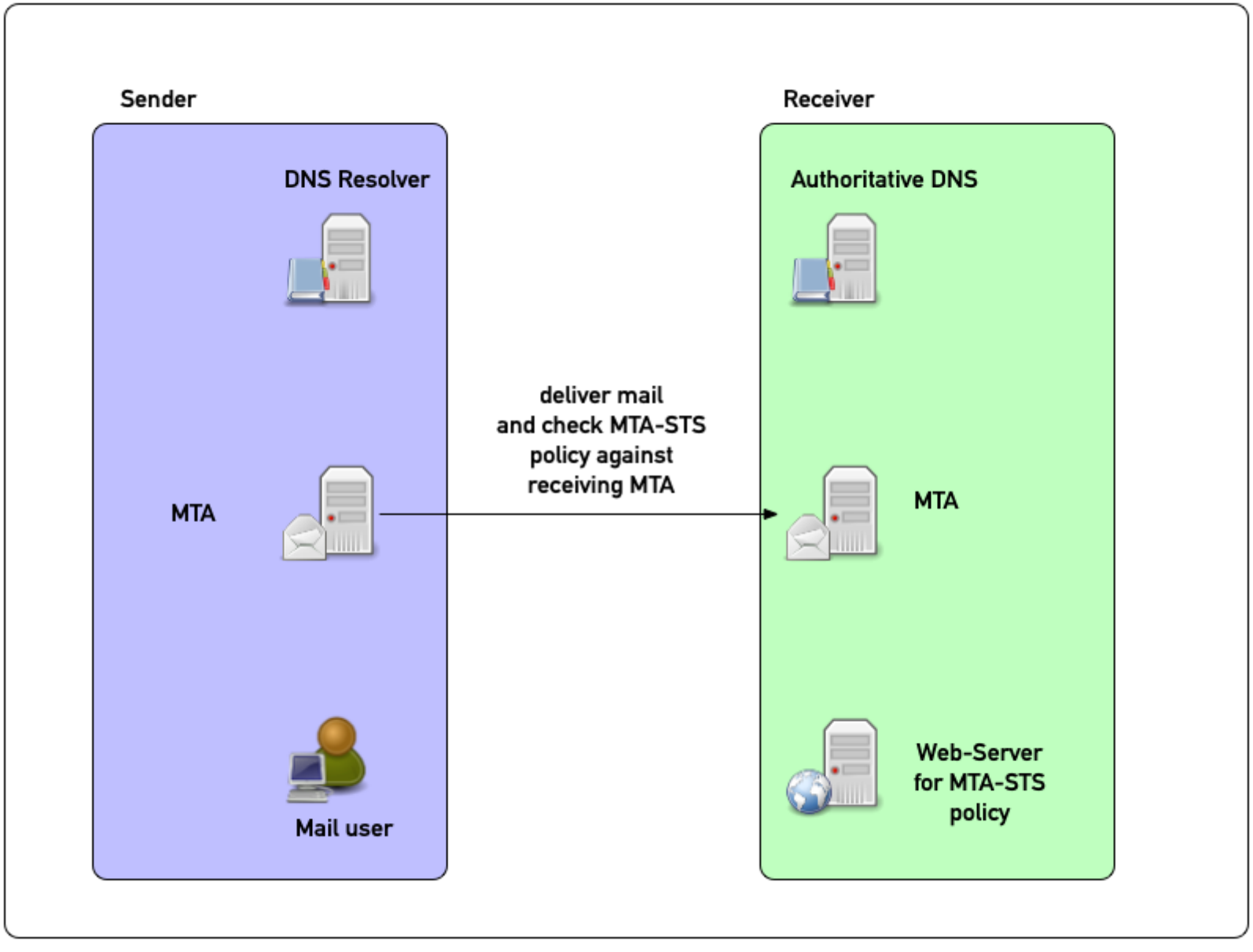
MTA-STS in pictures (3)


Sender
Receiver
DNS Resolver
MTA-STS TXT record lookup
Authoritative DNS
MTA
MTA
Mail user
Web-Server for MTA-STS policy

MTA-STS in pictures (4)


Sender
Receiver
DNS Resolver
Authoritative DNS
MTA
MTA
fetch MTA-STS policy document - Validate TLS connection
Mail user
Web-Server for MTA-STS policy

MTA-STS in pictures (5)


Sender
Receiver
DNS Resolver
Authoritative DNS
deliver mail
and check MTA-STS
policy against
receiving MTA
MTA
MTA
Web-Server
for MTA-STS
policy
Mail user

MTA-STS TXT record

Anatomy of the MTA-STS TXT record

MTA-STS policy document

MTA-STS policy document location

- The MTA-STS policy document is served by a web-server with TLS 1.2 (or better) transport security under the name **`mta-sts`** inside the mail domain
  - For the mail-domain **`example.org`**, the web-server would be named **`mta-sts.example.org`**.
  - The document is named **`mta-sts.txt`** and is located under the **`.well-known`** path
  - The document must be served as mime-type **`text/plain`**
  - The full URL for **`expample.org`** would be **`https://mta-sts.example.org/.well-known/mta-sts.txt`**

MTA-STS policy document content

- The policy document contains key/value pairs (each one line)
- Example of a real world MTA-STS policy file

```
% curl https://mta-sts.microsoft.com/.well-known/mta-sts.
version: STSv1
mode: enforce
mx: *.mail.protection.outlook.com
max_age: 604800
```

MTA-STS policy fields (1/2)

- **Version**: value `STSv1`
- **Mode**:
  - `none`: no policy should be enforced. This value can be used to migrate away from an active MTA-STS policy
  - `testing`: the policy is not enforced, but violations against the policy should be reported via TLS-Reporting (TLS-RPT, RFC 8460)
  - `enforce`: The MTA-STS policy must be enforced by sending MTAs, mail can only be delivered with transport security enabled and verified

MTA-STS policy fields (2/2)

- **MX**: incoming mail server domain name values for pattern matching - either full qualified domain names of receiving mail servers or wildcard domain names with `*` as the leftmost label
    - this value defines the names of incoming mail server for this mail domain
    - multiple `mx` lines can exist

- **MAX-AGE**: maximum lifetime of this policy in seconds (max value 31.557.600 seconds = 1 year). This value is being used by sending MTAs to control the caching of the policy

MTA-STS security

- MTA-STS does not mandate DNSSEC security for the lookup of the MTA-STS TXT record
    - Attacker can disable MTA-STS by blocking/removing DNS lookups

- The use of HTTPS as a policy channel enables new types of denial-of-service attacks against the mail infrastructure

MTA-STS and DANE

- *Security*: DANE does not allow downgrade-attacks (because it mandates DNSSEC), MTA-STS can be disabled by DNS attacks when not DNSSEC secured
- *Caching*: DANE uses DNS as its caching layer, MTA-STS requires an extra caching infrastructure in each MTA
- *Complexity*: The additional HTTPS/Web component increases the complexity of the MTA software and enables new attack vectors against mail server software

MTA-STS and DANE

- MTA-STS and DANE can both be deployed for a mail domain
  - When there are conflicting information from DANE and MTA-STS, the DANE information has priority (more secure) and MTA-STS cannot be used to override DANE

- Whenever possible, DANE should be preferred over MTA-STS

End

Questions? / Answers!