Mutual Declaration Mechanism of Multi-provider Relationship for Trusted Web Services

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What M2DMRT does?

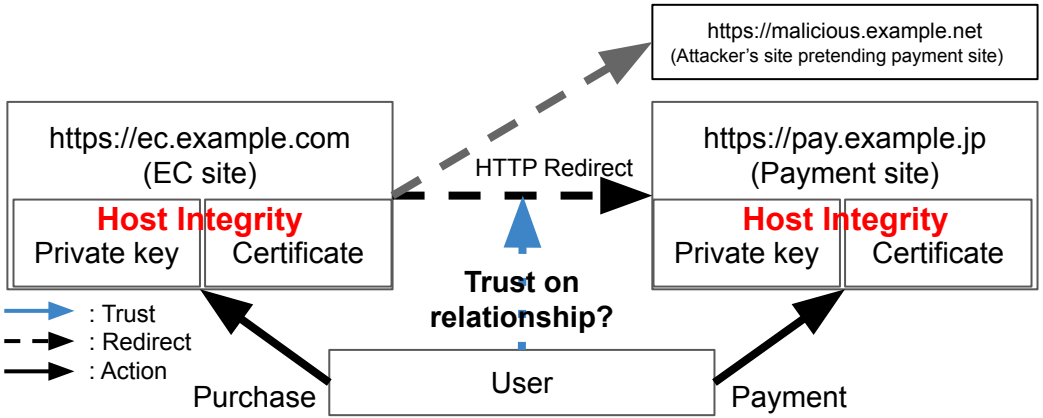
M2DMRT

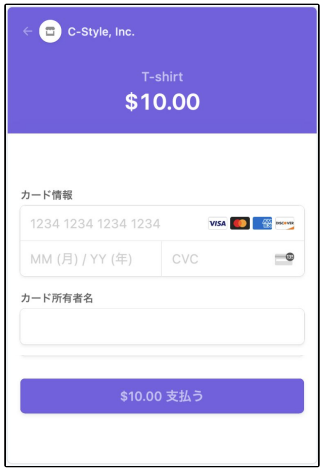
Mechanism of Mutual Declaration
of Multi-provider Relationship for Trusted Web services

Purpose	Contribution	Approach
Declaration and verification of redirect relationship of multiple SPs	Light-weight, self-manageable declaration of trust using digital signature of opponent TLS public key	- Declaration of relationship using DNSSEC - Mutual declaration by related SPs

TLS based security and redirection

- Security of Web is based on integrity assurance of hosts by TLS server certificate.
- Backend structure is being more complex, resulting in composing single Web service over multiple service providers (SPs) [5][6]
- This research focuses on the threat model regarding trust on multiple SPs' relationship when redirecting service traffic.

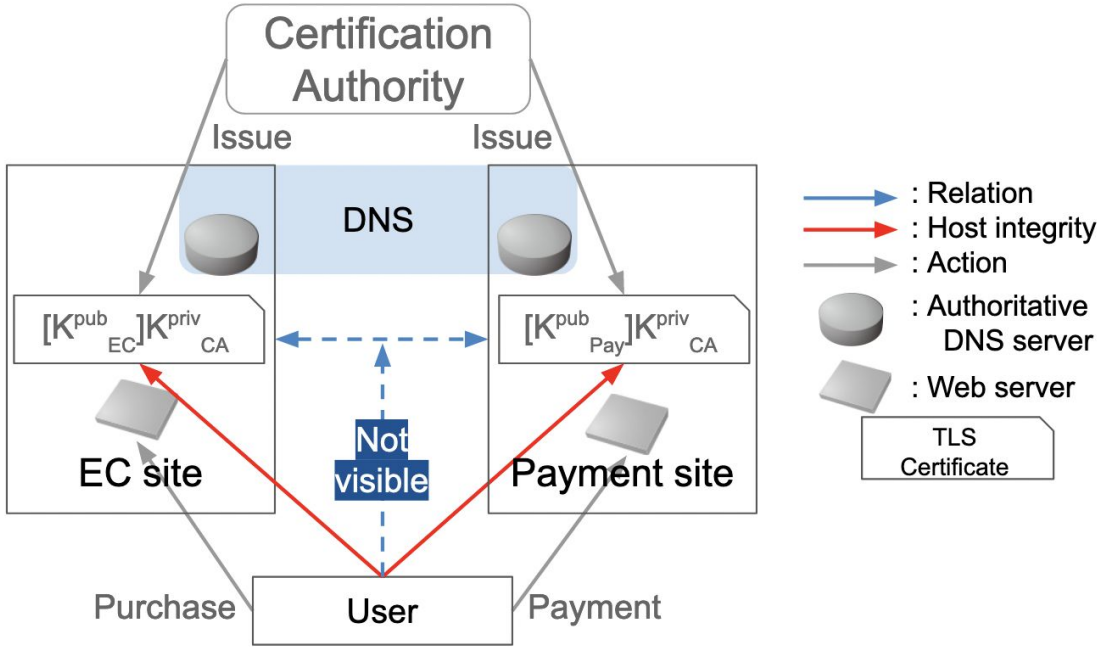




Problem statement

Integrity of single Web service containing multiple hosts/domain names

1. The host integrity is not always same as the service integrity.
2. TLS only assures the host integrity.[8][9][10][11][12][13]



Requirements

1. **Mutual** and **verifiable** declaration of service relationship
2. **Self-manageable** declaration of service relationship
3. **Minimum disclosure** of each party's components

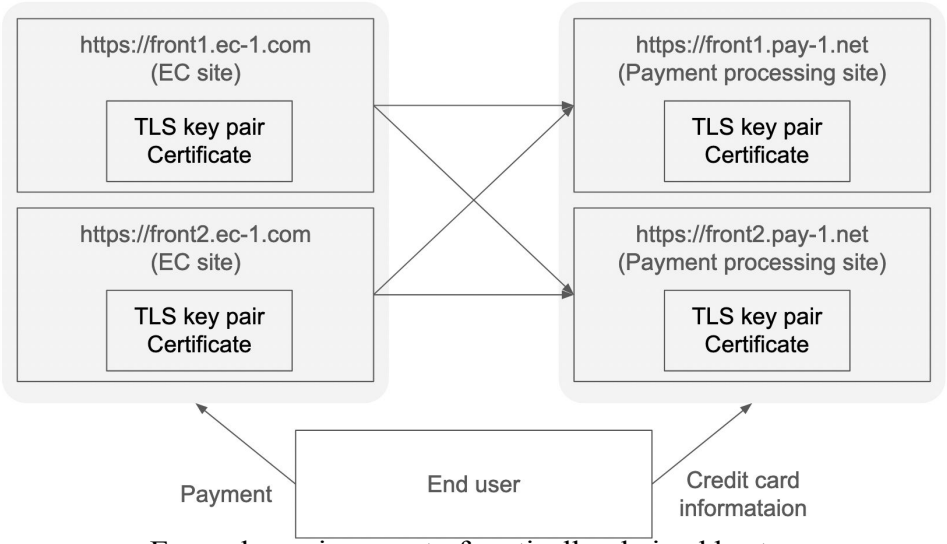
Against the threat model

4. **Localization of transaction** of declaration modification
5. **Localization/minimization of failure points** (independent from central authority)

System requirements

Requirements against feasibility

6. Adoption to the **Vertically-chained** Environment
7. Adoption Potential in **Horizontally-chained** Environments
8. Minimal **Processing Time** of Modification



Example environment of vertically-chained hosts.

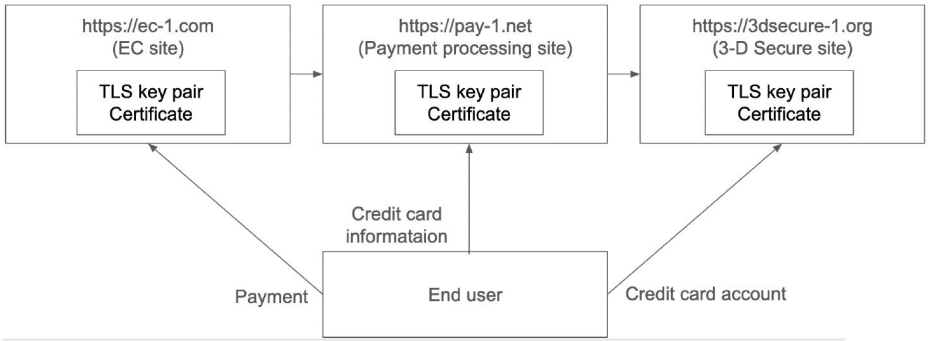
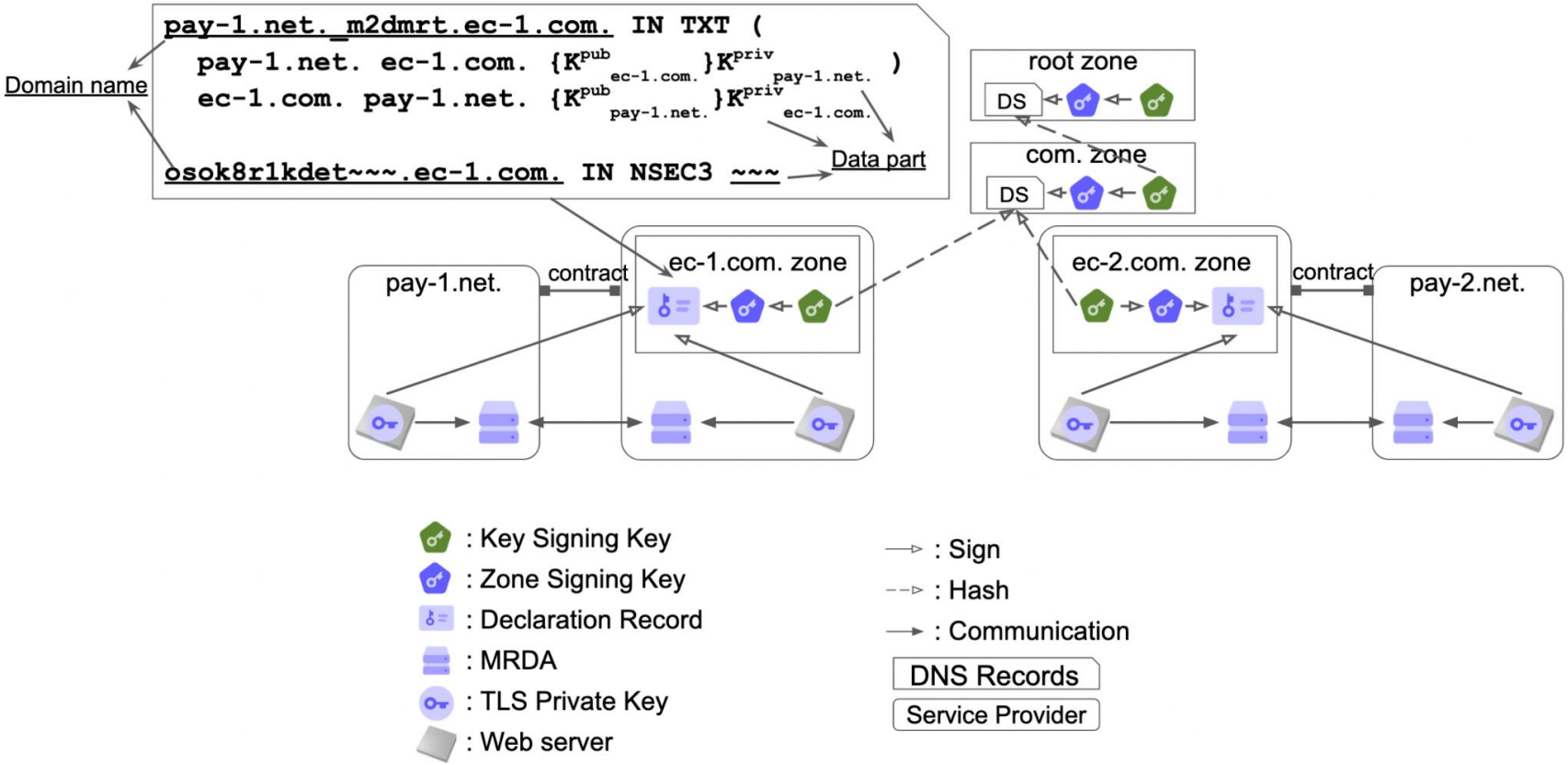


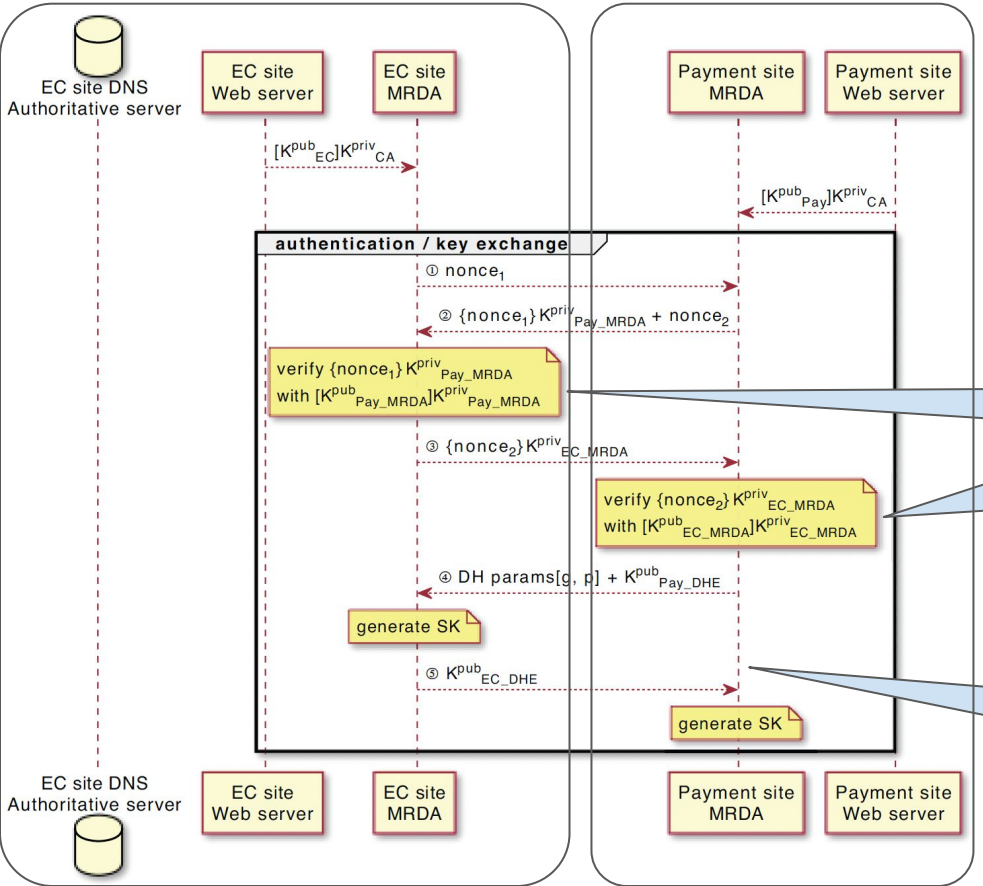
Fig. 2.1: Example environment of horizontally-chained hosts.

Proposal: M2DMRT



Registration sequence (1)

MRDA: Mutual Relation Declaration Agent



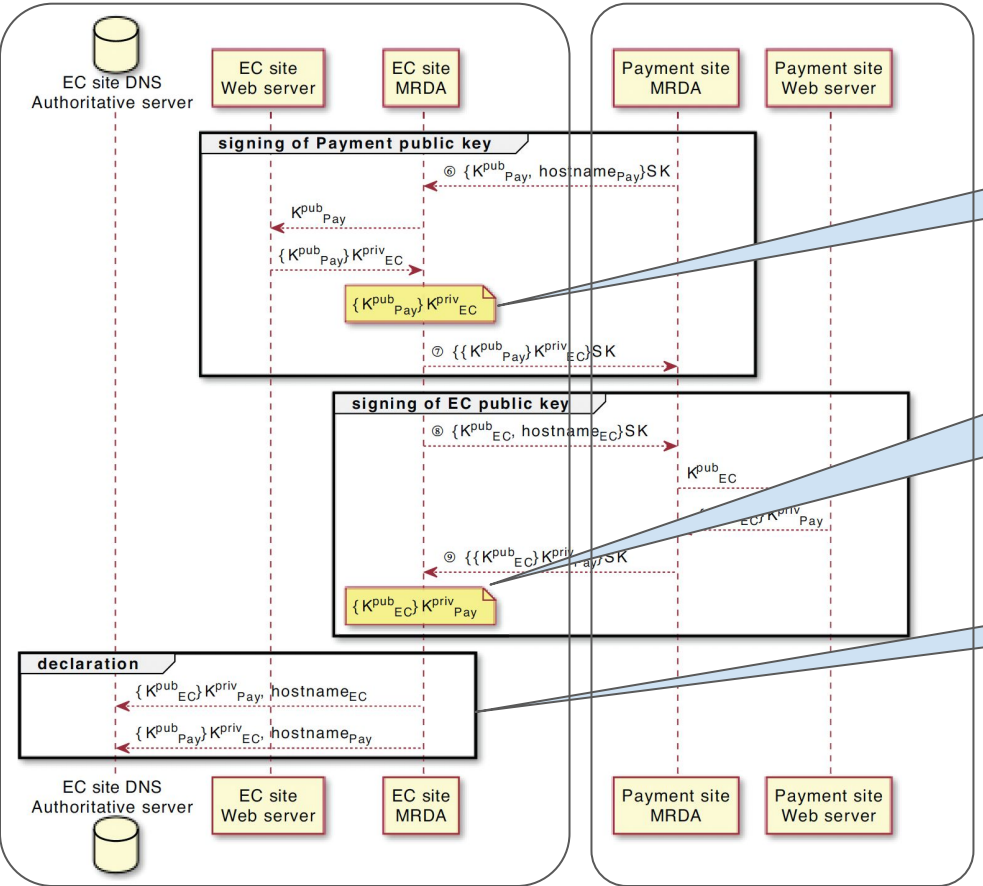
Authenticates the opponent MRDA to register

EC site's MRDA authenticates payment site's MRDA

Payment site's MRDA authenticates EC site's MRDA

Generates shared key using DHE kex
→Encrypts lasting communications with AES

Registration sequence (2)



Generates signature against payment site's pubkey

Generates signature against EC site's pubkey

Publish signatures as DNS records
→Mutual declaration

Declaration record

{dest_web}._m2dmrt.{origin_web}. IN TXT {signer_fqdn} {target_fqdn} {signature}

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DNSSEC signed

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