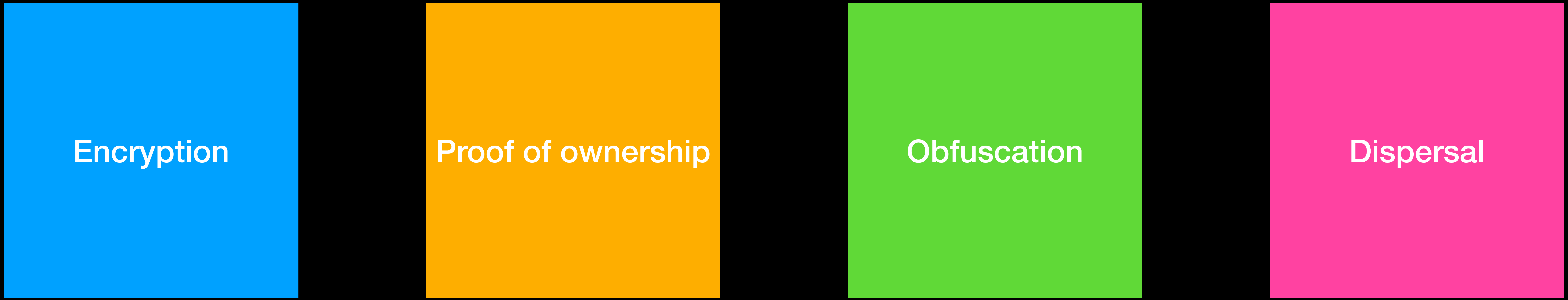
Data Deduplication and Security

Business Continuity

Secure Deduplication Solutions

Shin et al.



Encryption

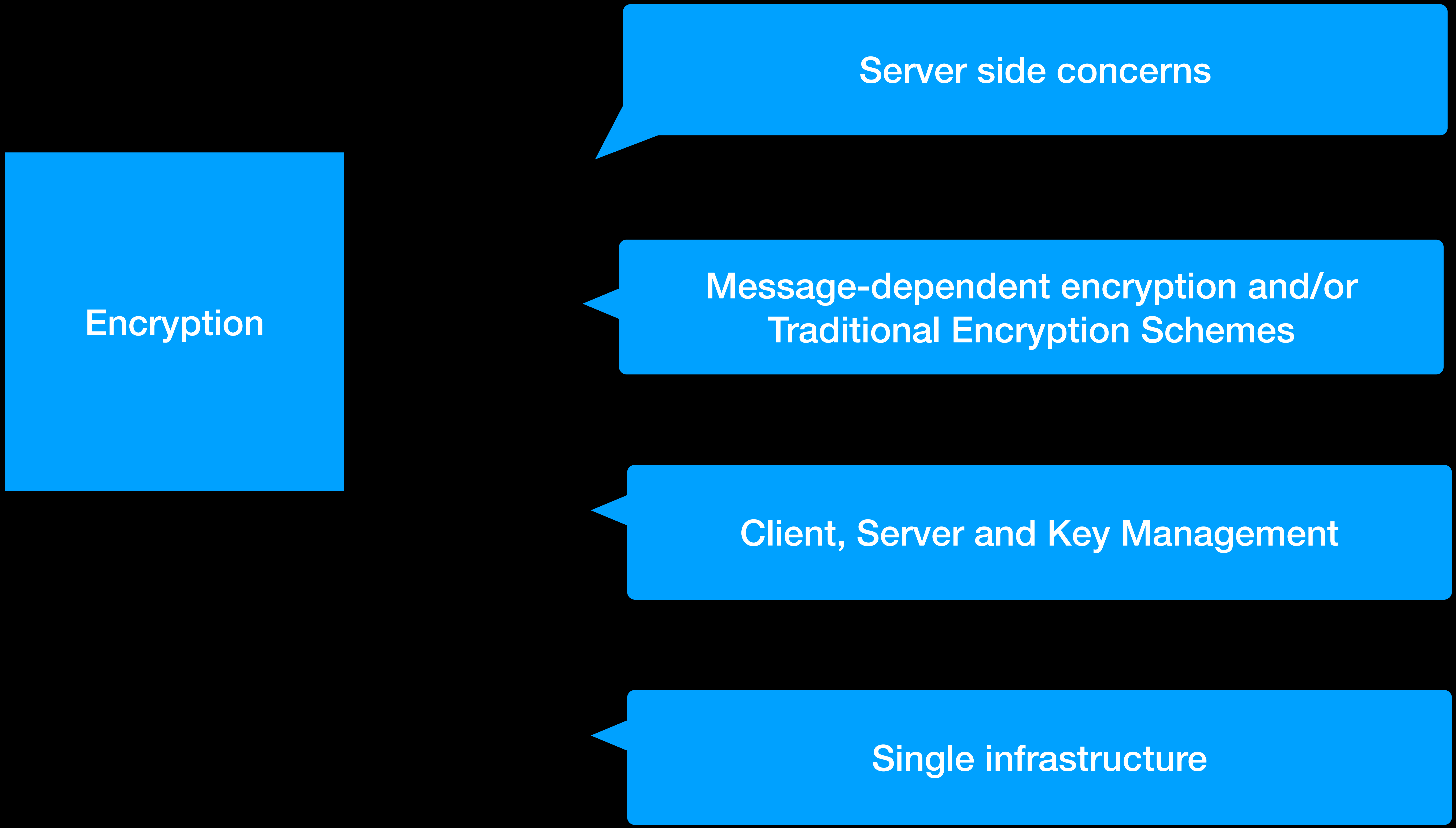
Proof of ownership

Obfuscation

Dispersal

Secure Deduplication Solutions

Shin et al.



Encryption

Server side concerns

Message-dependent encryption and/or Traditional Encryption Schemes

Client, Server and Key Management

Single infrastructure

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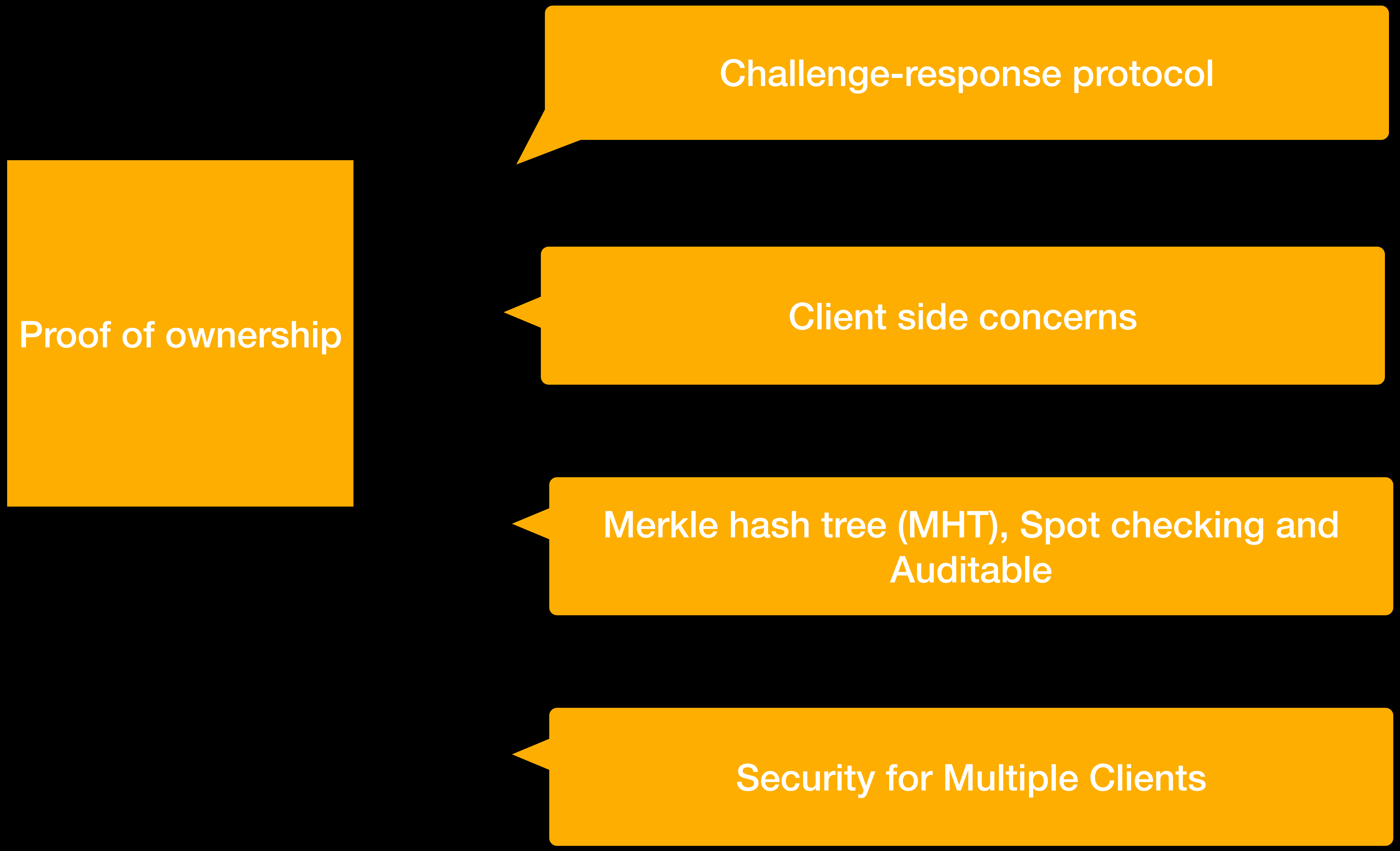

Proof of ownership

Challenge-response protocol

Client side concerns

Merkle hash tree (MHT), Spot checking and Auditable

Security for Multiple Clients

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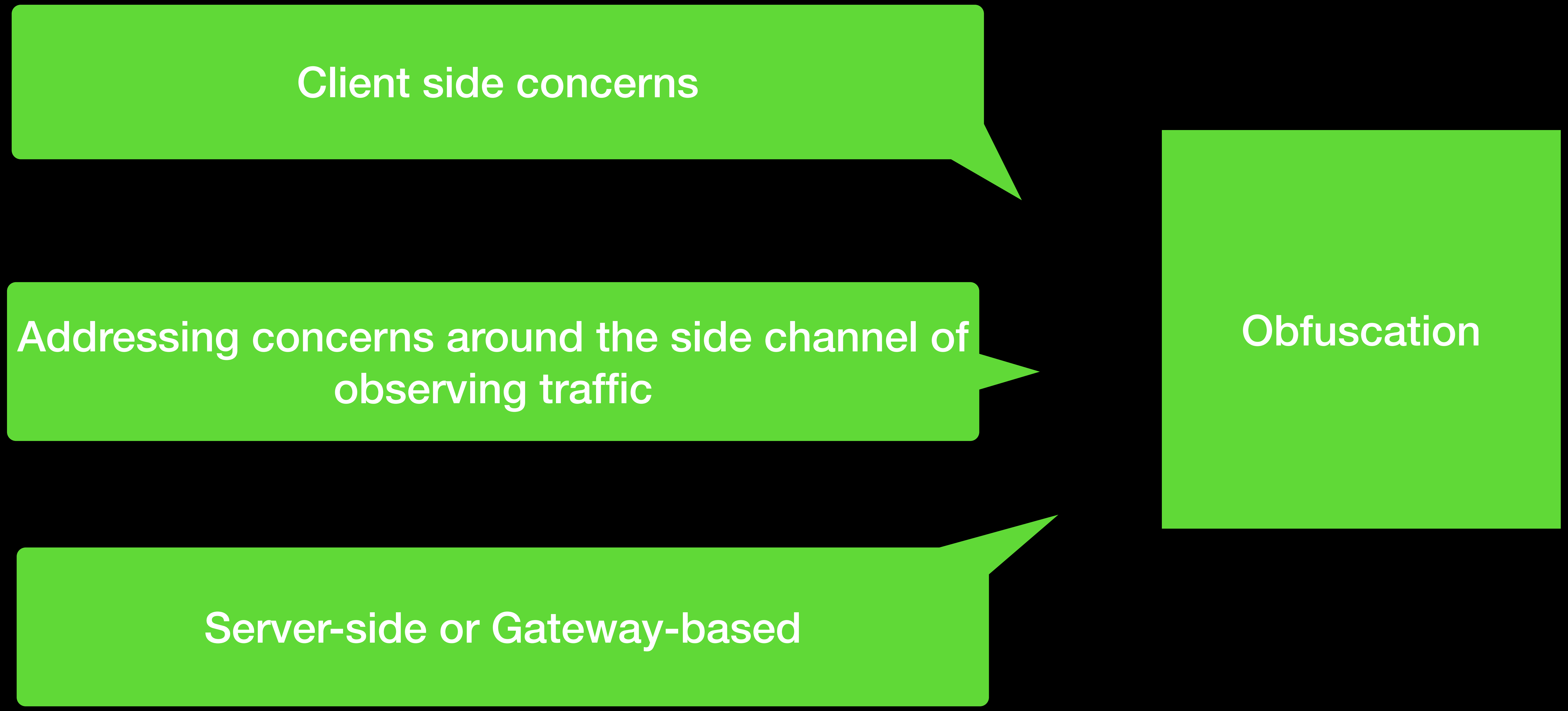

Client side concerns

Addressing concerns around the side channel of observing traffic

Server-side or Gateway-based

Obfuscation

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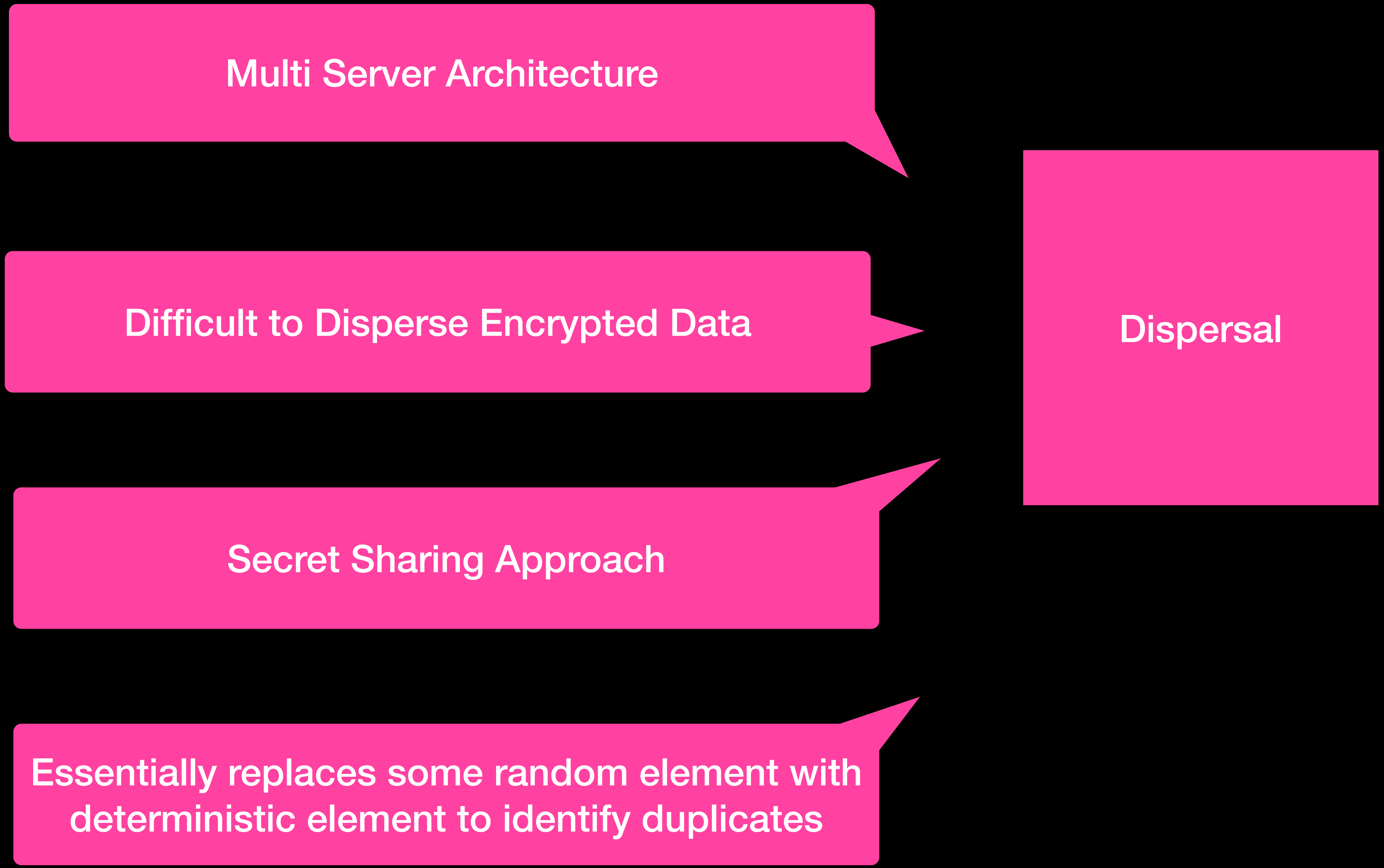

Multi Server Architecture

Difficult to Disperse Encrypted Data

Secret Sharing Approach

Essentially replaces some random element with deterministic element to identify duplicates

Dispersal

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Encryption

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Encryption

Secure Deduplication Solutions

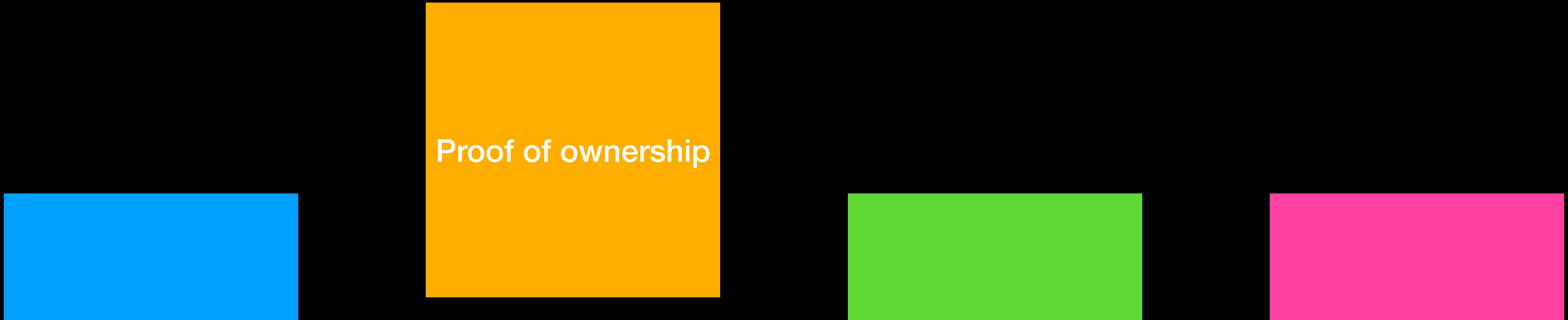
- Encryption is an effective control in ensuring the confidentiality, but **traditional encryption approaches can undermine deduplication.**
  - Infrastructure owner will encounter difficulties to identify duplicate data from different cipher texts generated by different users with different keys.
  - Challenging to efficiently store different cipher texts from different users.

Encryption

Proof of ownership

Secure Deduplication Solutions

- Proof of ownership (PoW) in deduplication can be ownership of the fingerprint of the binary data.
- However, this fingerprint could be easily shared or obtained and so infrastructure providers may want to implement PoW protocol.
- PoW protocols can be used to confirm that a client is the owner of binary data and it can be retrieved.

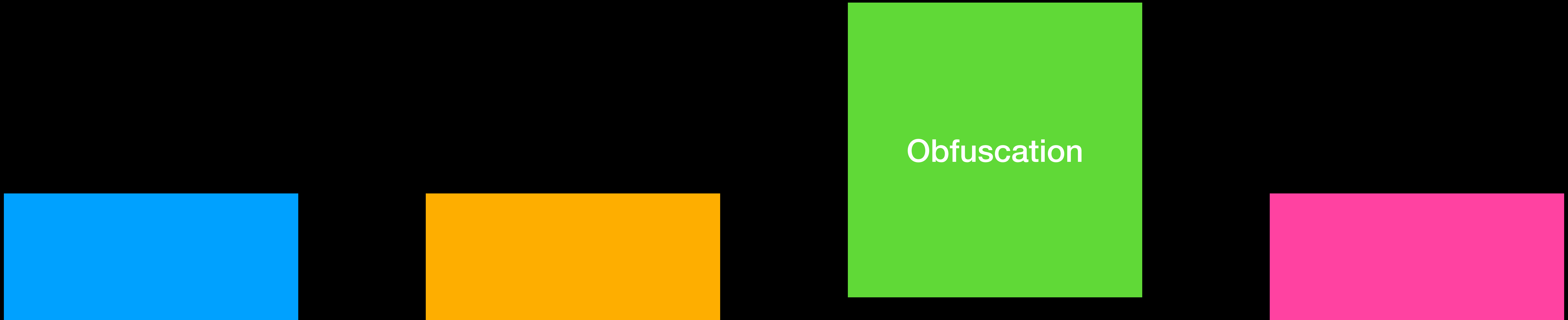


Obfuscation

Secure Deduplication Solutions

- Deduplication processes can potentially leak information when binary data is not uploaded after binary data is confirmed as already existing on the infrastructure.

- Traffic obfuscation processes can be used to mask and remove the level of information an attacker can infer from data being transferred from clients to infrastructure.



Obfuscation

Dispersal

Secure Deduplication Solutions

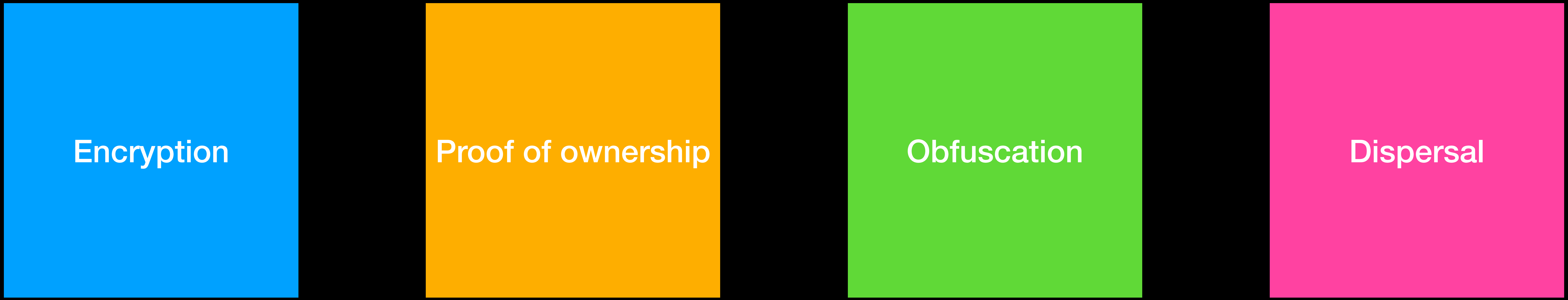
- Deduplication solutions are often discussed in terms of a single infrastructure and single client, but is desirable to spread binary data across multiple deployments. Data deduplication with encryption across multiple infrastructures is challenging.

- An alternative solution is to use secret sharing techniques instead of encryption solutions to disperse information across infrastructures.

Dispersal

Secure Deduplication Solutions

Shin et al.



Encryption

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