OpenID

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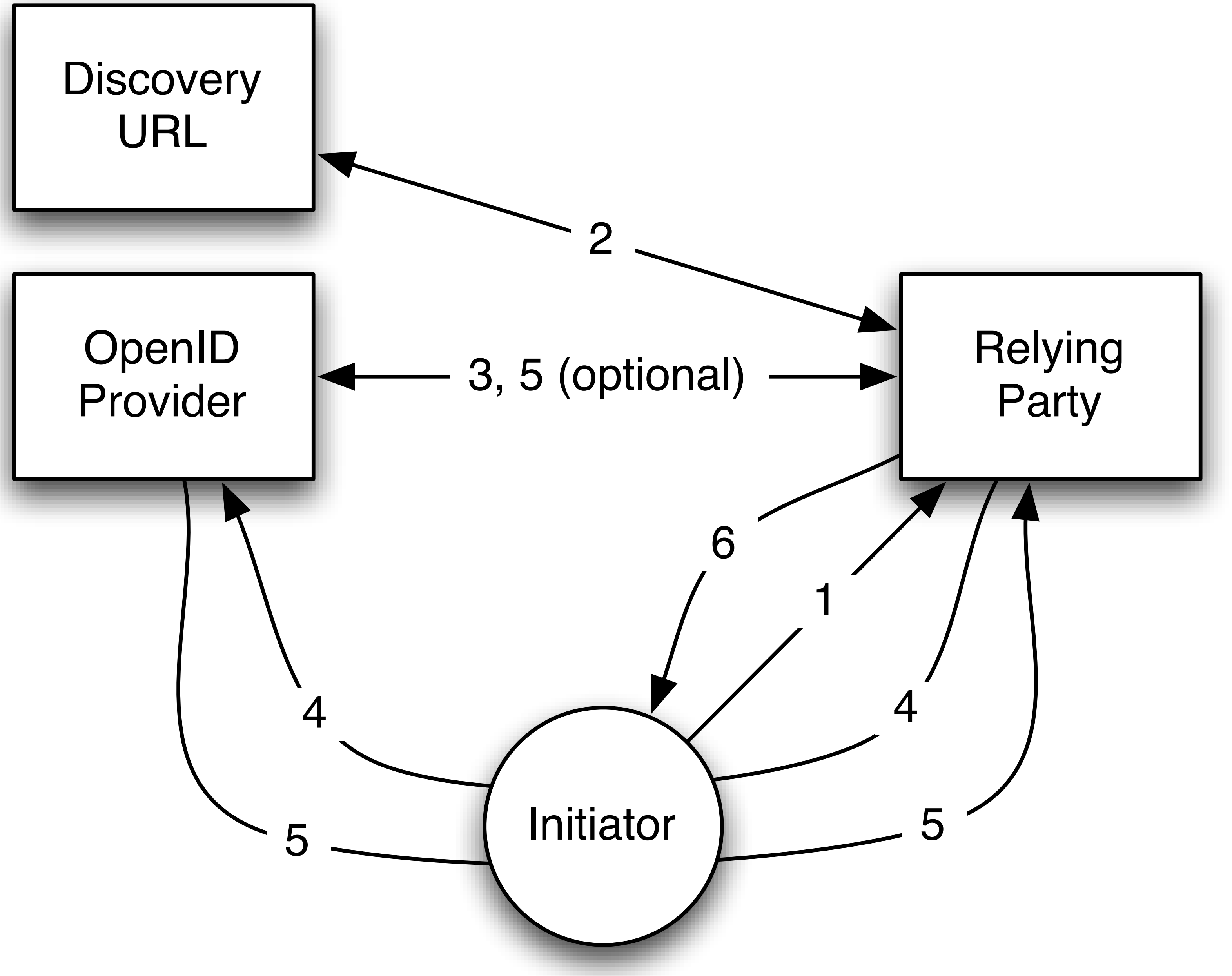
The Protocol



Protocol Messages

- Initiator: User-supplied identifier (USI) (1)
- RP: discovery (2), secret sharing (3)
- Indirect messages
  - RP to OP: USI, RP, secret handle (4)
  - OP to RP: USI, OP, RP, secret handle, nonce, signature (5)
- Fields must match, the signature must verify, nonce must be unique
- RP issues an ID token (6)

Identity Asymmetries

- RP and OP identified by URIs
- Initiator identified by:
  - User-supplied identifier
  - Session cookies
  - IP address (implicitly)

Message-Level Vulnerabilities

- Protocol designers/implementors not concerned with conventional MITM attacks:
  - Attacker could substitute own OP endpoint URL during discovery
  - OP session cookie could be stolen by eavesdropper

Message-Level Vulnerabilities

- Entire protocol can be conducted over SSL
  - HTTPS URLs make MITM attacks impossible for our purposes
  - Far from universally implemented, but an easy excuse for ignoring MITM attacks
- Nonce to prevent replay attacks: the only network-level countermeasure

Message-Level Vulnerabilities

- Protocol designers more concerned with user agent-level manipulations
  - Nonce needed since response messages may be passed through user agent
  - Still not all such manipulations: phishing ignored as “out-of-scope”

A Less Trivial Attack

- Malicious JavaScript submits login form automatically
- User invisibly forced to login with mode “checkid_immediate”
- Puts RPs with XSRF vulnerabilities at particular risk, since users stay logged in with an OP for extended periods

Another Nontrivial Attack

- Session Swapping (Barth, et al.)
- Victim logged in with malicious party's credentials
- Relies on RP willingness to set a cookie with any user agent that supplies a legitimate-seeming authorization response

Variation on Session Swapping

- Suppose the RP prevents cross-site login form submission
- Adversary initiates login in with victim's USI
- XSRF the RP-OP authentication request
- Victim unwittingly logged in with own credentials

Limited Adversaries

- Full MITM power, but only over information passed through user agent?
- Malware?
- Denial of Service?

Problems

- Web-based protocol attacks are hard to model
  - Messages sources a subtle issue: multiple kinds of identifiers (USI, cookie, IP)
  - What privileges should the intruder possess?
- Much unspecified by OpenID protocol

One More Idea

- Fallacy: RP has nothing to gain from dishonesty
  - Authentication status not strictly binary
  - OpenID extensions allow arbitrary information to be transmitted back to the RP
- Falsifying the realm attribute