Problem refresher from 117
You can use Let’s Encrypt (ACME), provide some configuration, but you **can not** specify your own ACME server or account binding.

Or you can upload a custom certificate.
PROBLEM

△ A certificate with a validity of 90-days ‘requires’ automation
  ◦ Renewing a certificate manually 4-6 times will not be ‘appreciated’

△ When subscribers can’t specify their preferred ACME server, the default will become the norm!

△ If the default is the norm, we lack issuer diversity which risks becoming a single point of failure.

△ (side-benefit: prioritized list of fallback ACME servers for a given domain)

How do we automate discovery of the domain owner’s preferred CA?
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How do we automate discovery of the domain owner’s preferred CA?
REVIEW: GENERAL IDEA

Joe Admin (domain owner) configures joesdomain.com with DNS joesdomain.com CAA 0 issue "ca.cacorp.com" to configure ACMEbot with Cloud, inc (Cloud Service Provider) joesdomain.com. We’re just missing this ... ACMEbot ... and this ca.cacorp.com ... an ACME server.

... you would think there’s enough info here to send ACMEbot to the Joe’s preferred ACME server ...
Current Status
Status

• A new draft (-02) was released incorporating the feedback received.
• We have identified (and are attempting to solve) more challenges around the external/internal account binding mechanisms.
  – General problem: How to associate incoming ACME requests with the correct CA account?
  – Sub-Problem 1: The ACME account will be owned by the CSP and may either be reused across all customers they manage, or may be a fresh account per ACME request.
    – So we cannot use ACME account to retrieve the appropriate CA account.
  – Sub-Problem 2: multiple CA accounts are authorized to issue for the same domain.
    – So we cannot use requested domain to retrieve the appropriate CA account.
Problem 0: External Account Binding keys

- ACME already has External Account Binding keys, but they can’t be leveraged here because:

1. Passing Joe’s EAB key down to ACMEBot requires UI changes in Cloud, inc.

2. Joe’s EAB key may have more permissions than Joe really wants to share with Cloud, inc.
Problem 1: ACME accounts are not unique per CA account

- Most service providers currently work by either having a single ACME account per CA, or generating throwaway ACME accounts – ex.: Certbot automatically creates a new account for each ACME server but doesn’t know anything about users, actually, Cerbot creates the account keys in a shared config folder by default.

- This problem is described in section 9.3 of the security considerations of the draft.
Problem 2: Multiple CA accounts for the same domain

- In general, domain is not a unique way to disambiguate CA accounts.
- Unfortunately, this gets into details of how the CA’s “account data model” works.

CA (ca.cacorp.com)

Account: Widgets, inc
- Verified domains:
  - *.widgets.com

Sub-Account: Department A
- Cert Profile: TLS
- Inventory: 50

Sub-Account: Department B
- Cert Profile: S/MIME
- Inventory: 10,000

Widgets, inc (subscriber)

Department A: Web Server Admins
- Joe
- Susan

Department B: Email Server Admins
- Sophie
- Fred
Potential Account Binding (AB) Mechanisms

External AB
- Not supported by Cloud Service Providers (CSP).
- Unlikely to gain support as it requires interface and implementation changes by the CSP.
- Requires a unique account per CSP customer.

Internal AB (email)
- Described in section 7.1.2 of the draft.
- Prone to phishing attacks.
- Easier to implement than the EAB as required information (email) is already known by the CSP.
- Requires a unique account per CSP customer.

Internal AB (DV)
- Described in section 7.1.1 of the draft.
- Does not require any CSP changes.
- Requires a unique account.
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Design is still ongoing, we’re not sure this is right yet.

More vendor input is needed here!

For example, is email really the right mechanism? What about a UUID in the CAA DNS record to disambiguate accounts? Or maybe {domain + cert profile} is unique? More design needed.
Shared Account Binding

• Not described in the draft, looking for feedback

• Similar to where the CSP (Cloud Service Provider) is a reseller of the CA and uses one set of API credentials for multiple customers, except there would be no contract between the CA and the CSP

• The ACME key could identify the CSP, to allow CA customers to enable specific CSP
  – The CSP could publish its public key(s) in its well-known directory
  – The CSP could obtain a certificate for its ACME key and include it in the x5u parameter of the JWK
    – less likely to see broad adoption, involves validation costs and renewal procedures
  – A challenge response with the account key email address could be performed (based on the CSP domain, e.g., @aws.com)
    – less likely to see broad adoption, requires (automated) acknowledgement on the CSP side

• Domain Control Validation determines if the CSP is authorized to issue this certificate
Summary & Next Steps

• This draft **slowed down** when we realized there’s a hard problem buried in here.

• We need more design iteration on how to disambiguate which CA account a given ACME request should be associated with – we may need to consider authentication and authorization separately.

• This may need a **design group** of CAs and CSPs to make sure we’ve captured and addressed the sticky cases properly (some of which may be CA-specific).
Thank You

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