

JMAP  
Internet-Draft  
Intended status: Standards Track  
Expires: 5 November 2026

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4 May 2026

JSON Meta Application Protocol (JMAP) Email Delivery Push Notifications  
draft-ietf-jmap-emailpush-03

## Abstract

This document specifies an extension to the JSON Meta Application Protocol (JMAP) that allows clients to receive an object via the JMAP push channel whenever a new email is delivered that matches a client-defined filter. The object can also include properties from the email, to allow a user notification to be displayed without having to make a further network request.

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## 1. Introduction

The JSON Meta Application Protocol (JMAP) [RFC8620] defines a mechanism for creating a push subscription, allowing a client to be efficiently notified whenever the state on the server changes for a data type the client is interested in. This can be used to trigger a resync of that data in the client.

Many email clients wish to show the user a notification when a new email arrives. Email clients implementing JMAP for Mail [RFC8621] may subscribe to changes in the pseudo-type "EmailDelivery" to be notified just whenever a new email is delivered (as opposed to whenever changes are made to the Email data in general, which may be caused by user actions such as reading, organising, or deleting their mail). However, this does not meet the needs of some email clients in constrained environments, particularly on mobile:

1. Data is pushed for all email deliveries, but the client needs to receive them only when a message arrives for which it intends to show the user a notification. For example, this is commonly only shown for messages delivered to the inbox by default, not messages filtered to other mailboxes.
2. The client needs to make at least one HTTP request, and sometimes more, to resynchronise its datastore before it can show a visible notification to the user. This can sometimes fail when there is poor connectivity. In such circumstances, the client is only able to tell the user a new message has arrived, not any of the details such as who sent it, or the subject.

To address these issues, this document defines a way to receive a new EmailPush object via the JMAP push subscription. Clients can request a filter be applied to precisely restrict which messages they are notified about. Clients may request certain properties of the emails be included in the EmailPush object, so it has sufficient information to show the user notifications without having to make any further requests to the server.

### 1.1. Notational Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

Type signatures, examples, and property descriptions in this document follow the conventions established in Section 1.1 of [RFC8620].

### 1.2. Terminology

The same terminology is used in this document as in the core JMAP specification, see Section 1.6 of [RFC8620].

The term Email (with this specific capitalisation) is used to refer to the data type defined in Section 4 of [RFC8621].

## 2. Addition to the Capabilities Object

The capabilities object is returned as part of the JMAP Session object; see Section 2 of [RFC8620]. This document defines an additional capability URI.

### 2.1. urn:ietf:params:jmap:emailpush

The urn:ietf:params:jmap:emailpush capability support for the extensions to PushSubscription described in this document. The value of this property in the JMAP Session "capabilities" property is an empty object.

Accounts for which email delivery push is supported MUST have this capability in the account's "accountCapabilities" property. The value is an empty object.

Note, this capability may be supported in servers or accounts that do not support the urn:ietf:params:jmap:mail capability — in such servers, notification of new emails is supported but any further interaction will require use of a different protocol, such as IMAP [RFC9051].

### 3. The EmailPush object

An *\*EmailPush\** object represents one or more new messages that have been delivered to an account. It has the following properties:

*\*@type\**: String

This MUST be the string "EmailPush".

*\*accountId\**: Id

The id of the Account this Email is in.

*\*emails\**: Email[]

An array of objects representing the new messages. Each object has the properties of the Email object (as defined in Section 4.1 of [RFC8621]) that were requested by the client in the EmailPushConfig. If multiple emails arrive in quick succession, or the server comes back online after a period of downtime, it may include multiple Email objects in this array to reduce the number of push notifications it sends, avoiding rate limiting issues.

Note, push channels often have strict restrictions on the size of data that can be sent. The server MUST take care not to exceed this when amalgamating multiple Email objects into a single EmailPush.

In some cases, just a single Email may be too large. Properties MUST be added to this object in the order defined in the properties array of the associated EmailPushConfig. If adding a property would exceed the size limit for the push channel, the property MUST be omitted. Clients are RECOMMENDED to only request the properties they need for the visible notification, plus the "id" property if they want to then fetch further information.

*\*state\**: String

The state string for the Email data type, as would be returned by an "Email/get" call (Section 4.2 of [RFC8621]) for this account. If the server does not support [RFC8621], this property is omitted.

#### 4. Extension to the PushSubscription object

The PushSubscription object is defined in Section 7.2 of [RFC8620]. This document defines an extra property for this object:

**\*emailPush\***: Id[EmailPushConfig]|null

If not null, this is a map. The keys are Account ids for accounts with support for the urn:ietf:params:jmap:emailpush capability. The server will push EmailPush objects for these accounts when a new message arrives, in accordance with the associated EmailPushConfig options for the account.

An **\*EmailPushConfig\*** object has the following properties:

**\*filter\***: FilterOperator|FilterCondition|null

A filter to apply to determine which new messages to push an EmailPush object for. The FilterCondition is as defined in Section 4.4.1 of [RFC8621].

If urn:ietf:params:jmap:mail capability is not supported for an account, support for the "inMailbox" and "inMailboxOtherThan" filter conditions is OPTIONAL. However, if the server supports IMAP access to the same account with the ObjectID extension [RFC8474], it MUST support using mailbox ids discovered via IMAP with these filter conditions.

**\*properties\***: String[]

The list of properties to include in the "emails" value of the EmailPush object. This is the same as the properties argument in "Email/get", as defined in Section 4.2 of [RFC8621].

If urn:ietf:params:jmap:mail capability is supported the server MUST support all the properties it supports for the "Email/get" method. Otherwise, it MUST support the following properties:

- \* keywords
- \* from
- \* to
- \* cc
- \* subject
- \* preview
- \* receivedAt
- \* sentAt

And if the server supports IMAP ObjectID [RFC8474], it MUST also support the following properties:

- \* id

```
* threadId
* mailboxIds
```

```
*urgency*: String (default: "normal")
```

The urgency with which to send push notifications containing the EmailPush object when sending over Web Push [RFC8030]. The value must be an urgency-option, as defined in Section 5.3 of [RFC8030].

## 5. Example

An email client connects to a server over IMAP ([RFC9051]) and after authenticating, sees the OBJECTID [RFC8474] and JMAPACCESS [RFC9698] capabilities advertised.

The JMAPACCESS IMAP capability gives it the URL for the JMAP session resource, and guarantees the client can use the same credentials to authenticate that it used for IMAP. The client fetches the JMAP Session object and finds the following JMAP capabilities present:

```
{
  "urn:ietf:params:jmap:core": {
    "maxCallsInRequest": 50,
    "maxConcurrentUpload": 10,
    "maxObjectsInGet": 4096,
    "maxObjectsInSet": 4096,
    "collationAlgorithms": [
      "i;ascii-numeric",
      "i;ascii-casemap",
      "i;octet"
    ],
    "maxSizeUpload": 250000000,
    "maxSizeRequest": 10000000,
    "maxConcurrentRequests": 10
  },
  "urn:ietf:params:jmap:emailpush": {},
}
```

Figure 1: The "capabilities" property of a JMAP Session object

The server doesn't support urn:ietf:params:jmap:mail yet, so the client can't switch over to using JMAP fully instead of IMAP, but it does support urn:ietf:params:jmap:emailpush, so the client can now use JMAP to receive push notifications.

The user has asked the client to notify it of any message delivered to the inbox, plus any message delivered to another folder that has the \$notify keyword set. The client discovers the mailbox id of the inbox over IMAP using ObjectID, then creates a push subscription by making the following API request:

```
[["PushSubscription/set", {
  "create": {
    "4f29": {
      "deviceClientId": "a889-ffea-910",
      "url": "https://push.example.com/WmYD3enMWsSOE0ndiBZfYeg54j4eWHfI",
      "keys": {
        "p256dh": "BM0HH37xD8sEh8NeiHulhFuwxqeeruxPlX5S7XGWGjHY5UT5yZFQKAiihFQLP6GuEQP
QOtD9z28HRyV7elnndh8",
        "auth": "uwPFKACOLBipGPTVz4UCDg"
      },
      "types": [],
      "emailPush": {
        "A1412": {
          "filter": {
            "operator": "OR",
            "conditions": [
              { "inMailbox": "674cc240-95db-49ce-a8a2-054f4f733095" },
              { "hasKeyword": "$notify" }
            ]
          },
          "properties": ["from", "subject", "id"]
        }
      }
    }
  },
  "0" ]]
```

Figure 2: "methodCalls" Property of a JMAP Request

The server creates the push subscription and immediately pushes a PushVerification object to the client. The client updates the PushSubscription object with this value to validate it as per Section 7.2.2 of [RFC8620]. With this done, the server will now push an EmailPush object whenever a new message arrives that's delivered to the mailbox with id "674cc240-95db-49ce-a8a2-054f4f733095", or has the "\$notify" keyword. As the "types" property is the empty array, the server will not push any StateChange objects. For example, a message arrives and the server pushes the following:

```
{
  "@type": "EmailPush",
  "accountId": "A1412",
  "emails": [{
    "from": [{ "name": "John Smith", "email": "john@example.com" }],
    "subject": "Surprise birthday party for Jane tonight",
    "id": "M699bb151ca4cbf1c24364a68"
  }],
  "state": "XH99813"
}
```

Figure 3: An EmailPush object

## 6. Security Considerations

All security considerations of JMAP [RFC8620] apply to this specification. Additional considerations are detailed below.

With the push defined in JMAP Core, no user data travels over the push channel, only state strings. The EmailPush object on the other hand contains sensitive user data. As specified in Section 8.7 of [RFC8620], to ensure confidentiality and integrity of the user's data, the client MUST specify encryption keys when establishing the PushSubscription and ignore any push notification received that is not encrypted with those keys.

## 7. IANA Considerations

### 7.1. JMAP Capability Registration for "emailpush"

IANA will register the "emailpush" JMAP Capability as follows:

Capability Name: urn:ietf:params:jmap:emailpush  
Specification document: this document  
Intended use: common  
Change Controller: IETF  
Security and privacy considerations: this document, Section 6

## 8. Normative References

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## 9. Informative References

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