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Redacted Fields in the Registration Data Access Protocol (RDAP) Response

Abstract

This document describes an RDAP extension for explicitly identifying redacted RDAP response fields, using JSONPath as the default expression language.

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1. Introduction

This document describes an RDAP extension for explicitly identifying
redacted RDAP response fields, using JSONPath as the default
expression language. A redacted RDAP field is one that has data
removed from the RDAP response due to the lack of client privilege
to receive the field. This extension can be used to identify
redacted RDAP fields in any RDAP object class, as defined in
[RFC7483], or RDAP fields defined in RDAP extensions. Because an
RDAP response may exclude a field due to either the lack of data or
based on the lack of RDAP client privileges, this extension is used
to explicitly specify which RDAP fields are not included in the RDAP
response due to redaction. It thereby provides a capability for
disambiguation between redaction and possible other reasons for data
or field absence.

In [RFC7482] RDAP supports both lookup and search queries, where a
lookup query responds with a single object and a search query
responds with a list of objects. This document applies to redaction
of a single object of a lookup response and in each of the objects
of a search response.

JSONPath, as defined in [I-D.ietf-jsonpath-base], is used as the default expression language to reference RDAP fields that have been redacted. The redacted JSON fields will either be removed or have empty values in the RDAP response. JSON is defined by [RFC8259].

2. Conventions Used in This Document

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.

The JSON examples include extra line breaks and whitespace. For instance, the JSONPath expressions are broken out into multiple lines when required for illustration.

3. Redaction Methods

Redaction in RDAP can be handled in multiple ways. The use of placeholder text for the values of the RDAP fields, such as the placeholder text "XXXX", MUST NOT be used for redaction. A placeholder text value will not match the format requirements of each of the RDAP fields and provides an inconsistent and unreliable redaction signal. This section covers the redaction methods that can be used with the redaction signaling defined in Section 4.2.

RDAP responses, as defined in [RFC7483], include a mix of JSON objects and JSON arrays, where JSON arrays are heavily used for entity objects with jCard [RFC7095]. jCard [RFC7095] is a JSON representation of vCard [RFC6350] that inherits its dependency on arrays. An example is the vCard [RFC6350] "ADR" property / jCard [RFC7095] "adr" property that defines a sequence of address components. According to [RFC6350], when an "ADR" property component value is missing, the associated component separator MUST still be specified. jCard [RFC7095] extends the use of arrays with each individual vCard property being represented by an array of three fixed elements, followed by one or more additional elements. The mix of JSON objects and JSON arrays impacts the methods used for redaction in RDAP.

The redaction of RDAP fields fall into the two categories of Redaction by Removal Method (Section 3.1) and Redaction by Empty Value Method (Section 3.2), defined in the following sub-sections.

3.1. Redaction by Removal Method

The Redaction by Removal Method is when the RDAP field is removed from the RDAP response, which is the preferred method. The Redaction by Removal Method can be done for all RDAP response fields other

than response fields using the position in an array to signal the
redacted field (e.g., the JSON arrays used with jCard [RFC7095]).
RDAP extensions such as JSContact in Registration Data Access
Protocol (RDAP) JSON Responses [I-D.ietf-regext-rdap-jscontact] do
not have a dependency on the use of positional JSON arrays and are
therefore suited for the Redaction by Removal Method.

When an RDAP object is redacted by removal, all of the RDAP object's
child fields are also removed. Only the redacted RDAP object needs
to be referenced in the list of redacted fields, as defined in
Section 4.2. An example of redacting an RDAP object is removing the
administrative contact from the RDAP response and including the
following "redacted" member:

```
"redacted": [
  {
    "name": {
      "type": "Administrative Contact"
    },
    "path": "$.entities[?(@.roles[0]=='administrative')]",
    "method": "removal"
  }
]
```

The Redaction by Removal Method MUST NOT be used to remove a field
using the position in a fixed length array to signal the redacted
field. For example, removal of an individual data field in jCard
[RFC7095] will result in a non-conformant jCard [RFC7095] array
definition.

3.2. Redaction by Empty Value Method

The Redaction by Empty Value Method is when a redacted field is not
removed, but its value is set to an empty value, such as "" for a
jCard [RFC7095] Text ("text") property or null for non-Text ("text")
properties. The empty jCard [RFC7095] values ("" or null) are
referenced in the "redacted" member in place of the jCard [RFC7095]
property name, such as referencing the "fn" jCard property value at
position 3 instead of referencing the "fn" jCard property name at
position 0. The Redaction by Empty Value Method SHOULD be used only
when redacting JSON response fields that use the position in an
array to signal the redacted field (e.g., jCard [RFC7095] arrays).
Optional jCard [RFC7095] properties SHOULD use the Redaction by
Removal Method (Section 3.1) to redact the entire property. The
required jCard [RFC7095] "fn" property, defined in section 6.2.1 of
vCard [RFC6350], MUST use the Redaction by Empty Value Method to
redact the property value. Removing the "fn" property would violate

vCard [RFC6350] and removing the property value would violate the
fixed array positions defined in jCard [RFC7095].

An example of the redacted field "fn" jCard property using the
Redaction by Empty Value Method:

```
[
  "fn",
  {},
  "text",
  ""
]
```

An example of the "redacted" member for the redacted "fn" jCard
property value, which is array position 3:

```
"redacted": [
  {
    "name": {
      "type": "Registrant Name"
    },
    "path": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[0]=='fn')][3]",
    "pathLang": "jsonpath",
    "method": "emptyValue",
    "reason": {
      "type": "Server policy"
    }
  }
]
```

4. Redacted RDAP Response

4.1. RDAP Conformance

RDAP responses that contain values described in this document MUST
indicate conformance with this specification by including an
rdapConformance ([RFC7483]) value of "redacted_0.1". The information
needed to register this value in the RDAP Extensions Registry is
described in Section 6.1.

Example rdapConformance member with the redacted extension:

```
"rdapConformance": [
  "rdap_level_0",
  "redacted_0"
]
```

4.2. "redacted" Member

The "redacted" member MUST be added to the RDAP response when there
are redacted fields. The "redacted" member is included as a member
of the object class in a lookup response, such as the object classes
defined in [RFC9083], and as a member of the object instances in a
search response, such as the object instances defined in [RFC9083].
The "redacted" member contains an array of redacted objects with the
following child members:

"name": A logical name for the redacted field. The logical name
    used for the redacted field is up to server policy. The logical
    name is defined using an object with a "type" field denoting a
    registered redacted name (see Section 6.2) or a "description"
    field denoting an unregistered redacted name. The registered
    redacted names and the chosen unregistered names can meet the
    needs of different RDAP services or industries.

"path": The JSON expression of the redacted field, using the
    expression language defined by the "pathLang" member. The JSON
    expression references a removed JSON field or an empty field
    value based on Section 3.

"pathLang": OPTIONAL JSON path expression language used, with the
    default value of "jsonpath" for JSONPath ([I-D.ietf-jsonpath-
    base]). Other JSON path expression languages MAY be used based on
    server policy.

"method": OPTIONAL redaction method used with "removal" indicating
    the Redaction By Removed Method (Section 3.1) and "emptyValue"
    indicating the Redaction by Empty Value Method (Section 3.2),
    with the default value of "removal".

"reason": OPTIONAL human readable reason(s) for the redacted field
    in the language defined by the [RFC7483] "lang" member. The
    default language is "en" if the [RFC7483] "lang" member is not
    specified. The reason is defined using an object with an OPTIONAL
    "type" field denoting a registered redacted reason (see see
    Section 6.2) and an OPTIONAL "description" field denoting an
    unregistered redacted reason. The "description" field MUST NOT be
    a client processing dependency.

Example unredacted version of an RDAP lookup response:

```json
{
  "rdapConformance": [
    "rdap_level_0"
  ],
  "objectClassName": "domain",
  "handle": "ABC123",
  "ldhName": "example.com",
  "secureDNS": {
    "delegationSigned": false
  },
  "nameservers": [
    {
      "objectClassName": "nameserver",
      "ldhName": "ns1.example.com"
    },
    {
      "objectClassName": "nameserver",
      "ldhName": "ns2.example.com"
    }
  ],
  "entities": [
    {
      "objectClassName": "entity",
      "handle": "123",
      "roles": [
        "registrar"
      ],
      "publicIds": [
        {
          "type": "IANA Registrar ID",
          "identifier": "1"
        }
      ],
      "vcardArray": [
        "vcard",
        [
          [
            "version",
            {},
            "text",
            "4.0"
          ],
          [
            "fn",
            {},
            "text",
            "Example Registrar Inc."
          ],
          [
```

```
        "adr",
        {},
        "text",
        [
          "",
          "Suite 100",
          "123 Example Dr.",
          "Dulles",
          "VA",
          "20166-6503",
          "US"
        ]
      ],
      [
        "email",
        {},
        "text",
        "contact@organization.example"
      ],
      [
        "tel",
        {
          "type": "voice"
        },
        "uri",
        "tel:+1.7035555555;ext=1234"
      ],
      [
        "tel",
        {
          "type": "fax"
        },
        "uri",
        "tel:+1.7035555556"
      ]
    ]
  ],
  "entities": [
    {
      "objectClassName": "entity",
      "roles": [
        "abuse"
      ],
      "vcardArray": [
        "vcard",
        [
          [
            "version",
            {},
```

```
            "text",
            "4.0"
          ],
          [
            "fn",
            {},
            "text",
            "Abuse Contact"
          ],
          [
            "email",
            {},
            "text",
            "abuse@organization.example"
          ],
          [
            "tel",
            {
              "type": "voice"
            },
            "uri",
            "tel:+1.7035555555;ext=1234"
          ]
        ]
      ]
    }
  ]
},
{
  "roles": [
    "registrant"
  ],
  "vcardArray": [
    "vcard",
    [
      [
        "version",
        {},
        "text",
        "4.0"
      ],
      [
        "fn",
        {},
        "text",
        "Registrant User"
      ],
      [
        "org",
```

```
          {},
          "text",
          "Example Inc."
        ],
        [
          "adr",
          {},
          "text",
          [
            "",
            "Suite 1235",
            "4321 Rue Somewhere",
            "Quebec",
            "QC",
            "G1V 2M2",
            "Canada"
          ]
        ],
        [
          "email",
          {},
          "text",
          "registrant.user@example.com"
        ],
        [
          "tel",
          {
            "type": "voice"
          },
          "uri",
          "tel:+1-555-555-1235;ext=123"
        ],
        [
          "tel",
          {
            "type": "fax"
          },
          "uri",
          "tel:+1-555-555-5321"
        ]
      ]
    ]
  },
  {
    "roles": [
      "technical"
    ],
    "vcardArray": [
      "vcard",
```

```
[
  [
    "version",
    {},
    "text",
    "4.0"
  ],
  [
    "fn",
    {},
    "text",
    "Technical User"
  ],
  [
    "org",
    {},
    "text",
    "Example Inc."
  ],
  [
    "adr",
    {},
    "text",
    [
      "",
      "Suite 1234",
      "4321 Rue Somewhere",
      "Quebec",
      "QC",
      "G1V 2M2",
      "Canada"
    ]
  ],
  [
    "email",
    {},
    "text",
    "technical.user@example.com"
  ],
  [
    "tel",
    {
      "type": "voice"
    },
    "uri",
    "tel:+1-555-555-1234;ext=321"
  ],
  [
    "tel",
```

```
              {
                "type": "fax"
              },
              "uri",
              "tel:+1-555-555-4321"
            ]
          ]
        ]
      },
      {
        "roles": [
          "administrative"
        ],
        "vcardArray": [
          "vcard",
          [
            [
              "version",
              {},
              "text",
              "4.0"
            ],
            [
              "fn",
              {},
              "text",
              "Administrative User"
            ],
            [
              "org",
              {},
              "text",
              "Example Inc."
            ],
            [
              "adr",
              {},
              "text",
              [
                "",
                "Suite 1236",
                "4321 Rue Somewhere",
                "Quebec",
                "QC",
                "G1V 2M2",
                "Canada"
              ]
            ],
            [
```

```
          "email",
          {},
          "text",
          "administrative.user@example.com"
        ],
        [
          "tel",
          {
            "type": "voice"
          },
          "uri",
          "tel:+1-555-555-1236;ext=789"
        ],
        [
          "tel",
          {
            "type": "fax"
          },
          "uri",
          "tel:+1-555-555-6321"
        ]
      ]
    ]
  }
],
"events": [
  {
    "eventAction": "registration",
    "eventDate": "1997-06-03T00:00:00Z"
  },
  {
    "eventAction": "last changed",
    "eventDate": "2020-05-28T01:35:00Z"
  },
  {
    "eventAction": "expiration",
    "eventDate": "2021-06-03T04:00:00Z"
  }
],
"status": [
  "server delete prohibited",
  "server update prohibited",
  "server transfer prohibited",
  "client transfer prohibited"
]
}
```

Example redacted version of an RDAP lookup response:

```json
{
  "rdapConformance": [
    "rdap_level_0",
    "redacted_0"
  ],
  "objectClassName": "domain",
  "ldhName": "example.com",
  "secureDNS": {
    "delegationSigned": false
  },
  "nameservers": [
    {
      "objectClassName": "nameserver",
      "ldhName": "ns1.example.com"
    },
    {
      "objectClassName": "nameserver",
      "ldhName": "ns2.example.com"
    }
  ],
  "entities": [
    {
      "objectClassName": "entity",
      "handle": "123",
      "roles": [
        "registrar"
      ],
      "publicIds": [
        {
          "type": "IANA Registrar ID",
          "identifier": "1"
        }
      ],
      "vcardArray": [
        "vcard",
        [
          [
            "version",
            {},
            "text",
            "4.0"
          ],
          [
            "fn",
            {},
            "text",
            "Example Registrar Inc."
          ],
          [
```

```
      "adr",
      {},
      "text",
      [
        "",
        "Suite 100",
        "123 Example Dr.",
        "Dulles",
        "VA",
        "20166-6503",
        "US"
      ]
    ],
    [
      "email",
      {},
      "text",
      "contact@organization.example"
    ],
    [
      "tel",
      {
        "type": "voice"
      },
      "uri",
      "tel:+1.7035555555"
    ],
    [
      "tel",
      {
        "type": "fax"
      },
      "uri",
      "tel:+1.7035555556"
    ]
  ]
],
"entities": [
  {
    "objectClassName": "entity",
    "roles": [
      "abuse"
    ],
    "vcardArray": [
      "vcard",
      [
        [
          "version",
          {},
```

```
              "text",
              "4.0"
            ],
            [
              "fn",
              {},
              "text",
              "Abuse Contact"
            ],
            [
              "email",
              {},
              "text",
              "abuse@organization.example"
            ],
            [
              "tel",
              {
                "type": "voice"
              },
              "uri",
              "tel:+1.7035555555"
            ]
          ]
        ]
      }
    ]
  },
  {
    "roles": [
      "registrant"
    ],
    "vcardArray": [
      "vcard",
      [
        [
          "version",
          {},
          "text",
          "4.0"
        ],
        [
          "fn",
          {},
          "text",
          ""
        ],
        [
          "adr",
```

```
            {},
            "text",
            [
              "",
              "",
              "",
              "",
              "QC",
              "",
              "Canada"
            ]
          ]
        ]
      ]
    },
    {
      "roles": [
        "technical"
      ],
      "vcardArray": [
        "vcard",
        [
          [
            "version",
            {},
            "text",
            "4.0"
          ],
          [
            "fn",
            {},
            "text",
            ""
          ],
          [
            "org",
            {},
            "text",
            "Example Inc."
          ],
          [
            "adr",
            {},
            "text",
            [
              "",
              "Suite 1234",
              "4321 Rue Somewhere",
              "Quebec",
```

```
                    "QC",
                    "G1V 2M2",
                    "Canada"
                ]
            ]
        ]
    ]
  }
],
"events": [
  {
    "eventAction": "registration",
    "eventDate": "1997-06-03T00:00:00Z"
  },
  {
    "eventAction": "last changed",
    "eventDate": "2020-05-28T01:35:00Z"
  },
  {
    "eventAction": "expiration",
    "eventDate": "2021-06-03T04:00:00Z"
  }
],
"status": [
  "server delete prohibited",
  "server update prohibited",
  "server transfer prohibited",
  "client transfer prohibited"
],
"redacted": [
  {
    "name": {
      "type": "Registry Domain ID"
    },
    "path": "$.handle",
    "pathLang": "jsonpath",
    "method": "removal",
    "reason": {
      "type": "Server policy"
    }
  },
  {
    "name": {
      "type": "Registrant Name"
    },
    "path": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[0]=='fn')][3]",
    "pathLang": "jsonpath",
    "method": "emptyValue",
```

```
      "reason": {
        "type": "Server policy"
      }
    },
    {
      "name": {
        "type": "Registrant Organization"
      },
      "path": "$.entities[?(@.roles[0]=='registrant')].
        vcardArray[1][?(@[0]=='org')]",
      "pathLang": "jsonpath",
      "method": "removal",
      "reason": {
        "type": "Server policy"
      }
    },
    {
      "name": {
        "type": "Registrant Street"
      },
      "path": "$.entities[?(@.roles[0]=='registrant')].
        vcardArray[1][?(@[0]=='adr')][3][:3]",
      "pathLang": "jsonpath",
      "method": "emptyValue",
      "reason": {
        "type": "Server policy"
      }
    },
    {
      "name": {
        "type": "Registrant City"
      },
      "path": "$.entities[?(@.roles[0]=='registrant')].
        vcardArray[1][?(@[0]=='adr')][3][3]",
      "pathLang": "jsonpath",
      "method": "emptyValue",
      "reason": {
        "type": "Server policy"
      }
    },
    {
      "name": {
        "type": "Registrant Postal Code"
      },
      "path": "$.entities[?(@.roles[0]=='registrant')].
        vcardArray[1][?(@[0]=='adr')][3][5]",
      "pathLang": "jsonpath",
      "method": "emptyValue",
      "reason": {
```

```
      "type": "Server policy"
    }
  },
  {
    "name": {
      "type": "Registrant Email"
    },
    "path": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[0]=='email')]",
    "method": "removal",
    "reason": {
      "type": "Server policy"
    }
  },
  {
    "name": {
      "type": "Registrant Phone"
    },
    "path": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[1].type=='voice')]",
    "method": "removal",
    "reason": {
      "type": "Server policy"
    }
  },
  {
    "name": {
      "type": "Technical Name"
    },
    "path": "$.entities[?(@.roles[0]=='technical')].
      vcardArray[1][?(@[0]=='fn')][3]",
    "method": "emptyValue",
    "reason": {
      "type": "Server policy"
    }
  },
  {
    "name": {
      "type": "Technical Email"
    },
    "path": "$.entities[?(@.roles[0]=='technical')].
      vcardArray[1][?(@[0]=='email')]",
    "method": "removal",
    "reason": {
      "type": "Server policy"
    }
  },
  {
    "name": {
```

```
          "type": "Technical Phone"
        },
        "path": "$.entities[?(@.roles[0]=='technical')].
          vcardArray[1][?(@[1].type=='voice')]",
        "method": "removal",
        "reason": {
          "type": "Server policy"
        }
      },
      {
        "name": {
          "description": "Technical Fax"
        },
        "path": "$.entities[?(@.roles[0]=='technical')].
          vcardArray[1][?(@[1].type=='fax')]",
        "reason": {
          "type": "Client request",
          "description": "Client requested the field redacted"
        }
      },
      {
        "name": {
          "type": "Administrative Contact"
        },
        "path": "$.entities[?(@.roles[0]=='administrative')]",
        "method": "removal",
        "reason": {
          "description": "Refer to the technical contact"
        }
      }
    ]
}
```

   Example unredacted version of an RDAP search response:

```
{
  "rdapConformance": [
    "rdap_level_0"
  ],
  "domainSearchResults":[
    {
      "objectClassName": "domain",
      "handle": "ABC121",
      "ldhName": "example1.com",
      "links":[
        {
          "value":"https://example.com/rdap/domain/example1.com",
          "rel":"self",
          "href":"https://example.com/rdap/domain/example1.com",
          "type":"application/rdap+json"
        },
        {
          "value":"https://example.com/rdap/domain/example1.com",
          "rel":"related",
          "href":"https://example.com/rdap/domain/example1.com",
          "type":"application/rdap+json"
        }
      ]
    },
    {
      "objectClassName": "domain",
      "handle": "ABC122",
      "ldhName": "example2.com",
      "links":[
        {
          "value":"https://example.com/rdap/domain/example2.com",
          "rel":"self",
          "href":"https://example.com/rdap/domain/example2.com",
          "type":"application/rdap+json"
        },
        {
          "value":"https://example.com/rdap/domain/example2.com",
          "rel":"related",
          "href":"https://example.com/rdap/domain/example2.com",
          "type":"application/rdap+json"
        }
      ]
    }
  ]
}
```

Example redacted version of an RDAP search response:

```
{
  "rdapConformance": [
    "rdap_level_0",
    "redacted_0"
  ],
  "domainSearchResults":[
    {
      "objectClassName": "domain",
      "ldhName": "example1.com",
      "links":[
        {
          "value":"https://example.com/rdap/domain/example1.com",
          "rel":"self",
          "href":"https://example.com/rdap/domain/example1.com",
          "type":"application/rdap+json"
        },
        {
          "value":"https://example.com/rdap/domain/example1.com",
          "rel":"related",
          "href":"https://example.com/rdap/domain/example1.com",
          "type":"application/rdap+json"
        }
      ],
      "redacted": [
        {
          "name": {
            "type": "Registry Domain ID"
          },
          "path": "$.domainSearchResults[0].handle",
          "pathLang": "jsonpath",
          "method": "removal",
          "reason": {
            "type": "Server policy"
          }
        }
      ]
    },
    {
      "objectClassName": "domain",
      "ldhName": "example2.com",
      "links":[
        {
          "value":"https://example.com/rdap/domain/example2.com",
          "rel":"self",
          "href":"https://example.com/rdap/domain/example2.com",
          "type":"application/rdap+json"
        },
        {
          "value":"https://example.com/rdap/domain/example2.com",
```

```
          "rel":"related",
          "href":"https://example.com/rdap/domain/example2.com",
          "type":"application/rdap+json"
        }
      ],
      "redacted": [
        {
          "name": {
            "type": "Registry Domain ID"
          },
          "path": "$.domainSearchResults[1].handle",
          "pathLang": "jsonpath",
          "method": "removal",
          "reason": {
            "type": "Server policy"
          }
        }
      ]
    }
  ]
}
```

5. JSONPath Considerations

JSONPath [I-D.ietf-jsonpath-base] is the default JSON path
expression language. This section covers considerations for servers
using [I-D.ietf-jsonpath-base] to identify redacted RDAP fields with
the "path" member of redacted objects in the "redacted" member. The
list of JSONPath considerations include:

1. Use absolute paths with the '$' JSONPath element. An example is
   "$.handle" for the "Registry Domain ID" in a lookup response or
   "$.domainSearchResults[0].handle" in a search response.
2. Validate a JSONPath expression using a non-redacted RDAP
   response, where evaluating the expression results in returning
   the redacted field.
3. Reference the removed object field when redacting an entire
   object by the Redaction by Removal Method (Section 3.1), where
   all of the object's child fields are explicitly removed. An
   example is "$.entities[?(@.roles[0]=='administrative')]" for
   the entire "Administrative Contact".
4. When an entity has multiple roles, include "redacted" members
   for each role using the role index. This will result in
   duplicate "redacted" members, but will enable the client to
   treat redaction consistently when there is a single role per
   entity or multiple roles per entity. An example is when the
   "roles" member has the value '["registrant","administrative"]',
```

redacting the "name" member of the entity will result in two
"redacted" members with the JSONPath expressions "$.entities[?
(@.roles[0]=='registrant')].vcardArray[1][?(@[0]=='fn')][3]"
and "$.entities[?(@.roles[1]=='administrative')].vcardArray[1]
[?(@[0]=='fn')][3]".

5. Reference the removed field when using the Redaction by Removal
   Method (Section 3.1). An example is "$.handle" for the
   "Registry Domain ID".

6. Reference index 0 of the jCard [RFC7095] property array, which
   is the jCard [RFC7095] "name" property, with a filter
   expression containing the name of the field, when redacting a
   jCard [RFC7095] field using the Redaction by Removal Method
   (Section 3.1). An example is "$.entities[?
   (@.roles[0]=='registrant')].vcardArray[1][?(@[0]=='email')]"
   for the "Registrant Email".

7. Reference jCard [RFC7095] field value or values redacted by
   array index 3 and greater, when redacting a jCard [RFC7095]
   field using the Redaction by Empty Value Method (Section 3.2).
   The jCard [RFC7095] property array index 3 and greater contain
   the property values, where the property values set with an
   empty value are referenced directly in place of the jCard
   [RFC7095] property name. Servers can then systematically redact
   jCard [RFC7095] field value or values based on the JSONPath
   expressions and clients will directly know which jCard
   [RFC7095] property values have been redacted. An example is
   "$.entities[?(@.roles[0]=='registrant')].vcardArray[1][?
   (@[0]=='fn')][3]" for the "Registrant Name" or "$.entities[?
   (@.roles[0]=='registrant')].vcardArray[1][?(@[0]=='adr')][3]
   [5]" for the "Registrant Postal Code".

8. RDAP extensions should define any special JSONPath
   considerations required to identify redacted RDAP fields if
   these considerations are insufficient.

## 6.  IANA Considerations

## 6.1.  RDAP Extensions Registry

IANA is requested to register the following value in the RDAP
Extensions Registry:

**Extension identifier:**  redacted_0.1
**Registry operator:**  Any
**Published specification:**  This document.
**Contact:**  IESG <iesg@ietf.org>
**Intended usage:**  This extension identifies the redacted fields in an
   RDAP response.

## 6.2. JSON Values Registry

Section 10.2 of [RFC9083] defines the JSON Values Registry with pre-defined Type field values and the use of the "Expert Review" policy defined in [RFC8126]. Two new JSON Values Registry Type field values are used to register pre-defined redacted name and reason values:

**"redacted name":**  Redacted name being registered. The registered redacted name is referenced using the "type" field of the redacted "name" field.

**"redacted reason":**  Redacted reason being registered. The registered redacted reason is referenced using the "type" field of the redacted "reason" field.

## 7.  Security Considerations

The server including a redacted signal provides an unauthorized client additional information related to the existence of data. Servers MAY exclude the redacted members for RDAP fields that are considered a privacy issue in providing a data existence signal.

## 8.  Acknowledgements

The authors wish to thank the following persons for their feedback and suggestions: Marc Blanchet, Scott Hollenbeck, Mario Loffredo, Gustavo Lozano, and Rick Wilhelm.

## 9.  References

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### 9.2.  Normative References

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## Appendix A.  Change History

### A.1.  Change from 00 to 01

1. Changed rdapConformance to use pointed "redacted_0.1" value to support structural changes of the extension up to the target of "redacted_1.0".

2. Updates based on the Gustavo Lozano feedback:

   1. Updated the language to change the special treatment of
      jCard to be more generic for future RDAP extensions that
      leverage fixed length JSON arrays.
   2. Added "RDAP extensions should define any special JSONPath
      considerations required to identify redacted RDAP fields
      if the these considerations are insufficient." to the
      JSONPath Considerations section to generalize it.
3. Updates based on the Marc Blanchet feedback:

   1. Added a reference to draft-ietf-regext-rdap-jscontact as
      an example of an RDAP extension that is suited for the
      Redaction by Removal Method based on the lack of
      dependency on positional JSON arrays.
   2. Added support for registered and unregistered (free-form)
      redaction reasons by changing the "reason" property to be
      a JSON object with the "type" and "description"
      properties. The "type" property includes registration in
      the IANA JSON Values Registry.
   3. Added a "JSON Values Registry" section in the IANA
      Considersations section to define the "redaction reason"
      JSON Values Registry Type values to support the
      registration of redaction reasons.
4. Updates based on the Mario Loffredo feedback:

   1. Added support for registered and unregistered (free-form)
      redaction names by changing the "reason" property to be a
      JSON object with the "type" and "description" properties.
      The "type" property includes registration in the IANA JSON
      Values Registry.
   2. Added a "JSON Values Registry" section in the IANA
      Considersations section to define the "redaction name"
      JSON Values Registry Type values to support the
      registration of redaction names.
   3. Added a JSONPath Considerations item associated with
      handling entities with multiple roles.
   4. Added language to restrict the extension to responses.

## A.2.  Change from 01 to 02

1. Updates to add support for RDAP search responses:

   1. Replaced "RDAP lookup response" with "RDAP response"
      throughout the draft to expand the scope to include
      search.
   2. Updated the description in the second paragraph of the
      Introduction to cover both a lookup response and a search
      response.

3.  Added an example of the use of an absolute path for a
    search response to the "JSONPath Considerations" section.
4.  Added a description of the placement of the "redacted"
    member in a lookup response and a search response in the
    ""redacted" Member" section.
5.  Added an example of an unredacted search response and a
    redacted search response in the ""redacted" Member"
    section.

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