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Authors: J. Gould *VeriSign, Inc.* D. Smith *VeriSign, Inc.* J. Kolker *GoDaddy Inc.* R. Carney *GoDaddy Inc.*

RFC 9537 Redacted Fields in the Registration Data Access Protocol (RDAP) Response

Abstract

This document describes a Registration Data Access Protocol (RDAP) extension for specifying methods of redaction of RDAP responses and explicitly identifying redacted RDAP response fields, using JSONPath as the default expression language.

Status of This Memo

This is an Internet Standards Track document.

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1. Introduction

This document describes an RDAP extension for specifying methods of redaction of RDAP responses and explicitly identifying redacted RDAP response fields, using JSONPath as the default expression language. A redacted RDAP field is one that has data removed or replaced in the

RDAP response due to server policy, such as 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 [RFC9083], or RDAP fields defined in RDAP extensions. Because an RDAP response may exclude a field due to either the lack of data or 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 other possible reasons for data or field absence.

In [RFC9082], 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 [RFC9535], is used as the default expression language to reference RDAP fields that have been redacted. The redacted JSON fields will be removed, have empty values, have partial values, or be replaced 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 empty space. For instance, the JSONPath expressions are broken out into multiple lines when required for illustration.

The JSONPath expressions in the examples are for illustration purposes with single-role entities, and the exact expressions to be used by the server are out of scope.

3. Redaction Methods

Redaction in RDAP can be handled in multiple ways. The resulting redacted RDAP response **MUST** comply with the format defined in the RDAP RFCs, such as [RFC9083] and updates. The use of placeholder text for the values of the RDAP fields, such as "XXXX", **MUST NOT** be used for redaction, since the placeholder text value may not match the format requirements of each of the RDAP fields, which could provide 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 [RFC9083], include a mix of JSON objects and JSON arrays, where JSON arrays are heavily used for entity objects with jCard [RFC7095]. jCard is a JSON representation of vCard [RFC6350] that inherits its dependency on arrays. An example is the vCard "ADR" property [RFC6350], or the jCard "adr" property [RFC7095], which 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 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 four categories defined in the following subsections.

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 default method. The Redaction by Removal Method can be done for all RDAP response fields except for response fields using the position in an array to signal the redacted field (e.g., the JSON arrays used with jCard). RDAP extensions, such as the one described in "Using JSContact in Registration Data Access Protocol (RDAP) JSON Responses" [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": {
      "description": "Administrative Contact"
    },
    "prePath": "$.entities[?(@.roles[0]=='administrative')]",
    "method": "removal"
  }
]
```

Figure 1: Redacted Administrative Contact

The Redaction by Removal Method **MUST NOT** be used to remove an element of an array where the position of the element in the array determines semantic meaning. For example, removal of an individual data field in jCard will result in a non-conformant jCard 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 text ("text") property or null for a non-text property. The empty jCard values ("" or null) are referenced in the "redacted" member in place of the jCard property name in an array, 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 **MUST** be used only when redacting JSON response fields that use the position in an array to signal the redacted field (e.g., jCard arrays). Optional jCard properties **MUST** use the Redaction by

Removal Method (Section 3.1) to redact the entire property. The required jCard "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.

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

Figure 2: Redacted "fn" jCard Property Using the Redaction by Empty Value Method

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

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

Figure 3: Redacted Registrant Name Using an Array Position

3.3. Redaction by Partial Value Method

The Redaction by Partial Value Method is when a redacted field is not removed but its value has a portion of the data removed, such as for the "label" or "fn" jCard properties. The partial values are referenced in the "redacted" member in place of the property name in an array, 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 Partial Value Method **SHOULD** be used only when redacting JSON response fields that use a formatted value, where a portion of the value is removed.

An example of the "label" jCard property in Section 3.3.1.3 of [RFC7095] that redacts "123 Maple Ave\nSuite 901\n":

```
["adr",
  {
    "type":"home",
    "label":"Vancouver\nBC\n1239\n"
  },
  "text",
  [
    "", "", "", "", "", "", ""
  ]
]
```

Figure 4: Redacted "label" jCard Property

An example of the "redacted" member for the redacted "label" jCard property value, based on Section 3.3.1.3 of [RFC7095]:

```
"redacted": [
  {
    "name": {
      "description": "Home Address Label"
    },
    "postPath": "$.vcardArray[1][?(@[0]=='adr')][1].label",
    "pathLang": "jsonpath",
    "method": "partialValue",
    "reason": {
      "description": "Server policy"
    }
  }
]
```

Figure 5: Redacted Label Using the Redaction by Partial Value Method

3.4. Redaction by Replacement Value Method

The Redaction by Replacement Value Method is when a redacted field is not removed but its value is replaced with a different value, such as protecting the "email" jCard property value with an anonymized email "text" value or the use of an alternative "uri" value to a web form. Replacing a property value is a form of redaction, since it protects the true property value for privacy reasons.

```
[
  "email",
  {},
  "text",
  "anonymized123@example.com"
]
```

Figure 6: Redacted "email" jCard Property Using the Redaction by Replacement Value Method with an Anonymized Email

```
"redacted": [
  {
    "name": {
      "description": "Registrant Email"
    },
    "postPath": "$.entities[?(@.roles[0]=='registrant')].
                 vcardArray[1][?(@[0]=='email')][3]",
    "pathLang": "jsonpath",
    "method": "replacementValue",
  }
]
```

Figure 7: Redacted Email Using a Replacement Value with an Anonymized "text" Value

```
[
  "contact-uri",
  {},
  "uri",
  "https://email.example.com/123"
]
```

Figure 8: Redacted "email" jCard Property Using the Redaction by Replacement Value Method with a "contact-uri" jCard Property to a Web Form

```
"redacted": [
  {
    "name": {
      "description": "Registrant Email"
    },
    "prePath": "$.entities[?(@.roles[0]=='registrant')].
               vcardArray[1][?(@[0]=='email')]",
    "replacementPath": "$.entities[?(@.roles[0]=='registrant')].
               vcardArray[1][?(@[0]=='contact-uri')]",
    "pathLang": "jsonpath",
    "method": "replacementValue",
  }
]
```

Figure 9: Redacted Email Using a Replacement Value with a "contact-uri" jCard Property to a Web Form

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" [RFC9083] value of "redacted". The "redacted" extension identifier is described in Section 6.1.

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

Figure 10: "rdapConformance" with Redacted Extension

4.2. "redacted" Member

The "redacted" member **MUST** be added to the RDAP response when there is one or more redacted fields. The "redacted" member is included as a member of the object instance in a lookup response, such as the object classes defined in [RFC9083], and as a member of the object instances in a search response.

The server, including a redacted signal, provides an unauthorized client additional information related to the existence of data and **MAY** exclude the redacted members for RDAP fields that are considered a privacy issue in providing a data existence signal. The server **MAY** choose to publish a redaction policy describing how this extension is implemented for their constituency. The contents of such a policy are outside the scope of this specification.

The "redacted" member contains an array of objects with the following child members:

"name": **REQUIRED** 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.

"prePath": **OPTIONAL** JSON path expression referencing a redacted JSON field in the pre-redacted response, using the expression language defined by the "pathLang" member. The "prePath" member **MAY** be set when the redacted field does not exist in the redacted response for the Redaction by Removal Method (Section 3.1) and the Redaction by Replacement Value Method (Section 3.4). The "prePath" member **MUST NOT** be set when the "postPath" member is set.

"postPath": **OPTIONAL** JSON path expression referencing a redacted JSON field in the redacted (post-redacted) response, using the expression language defined by the "pathLang" member. The "postPath" member **MUST** be set when the redacted field does exist in the redacted response for the Redaction by Empty Value Method (Section 3.2), the Redaction by Partial Value Method (Section 3.3), and the Redaction by Replacement Value Method (Section 3.4). The "postPath" member **MUST NOT** be set when the "prePath" member is set.

"replacementPath": **OPTIONAL** JSON path expression of the replacement field of the redacted field with the Redaction by Replacement Value Method (Section 3.4), using the expression language defined by the "pathLang" member.

"pathLang": **OPTIONAL** JSON path expression language used, with the default value of "jsonpath" for JSONPath [RFC9535]. Other JSON path expression languages registered with the "redacted expression language" Type in the "RDAP JSON Values" registry **MAY** be used based on server policy.

"method": **OPTIONAL** redaction method used, with one of the following values:

- "removal" indicating the Redaction by Removal Method (Section 3.1),
- "emptyValue" indicating the Redaction by Empty Value Method (Section 3.2),
- "partialValue" indicating the Redaction by Partial Value Method (Section 3.3), or
- "replacementValue" indicating the Redaction by Replacement Value Method (Section 3.4).

The default value is "removal" when not provided.

"reason": **OPTIONAL** human-readable reason(s) for the redacted field in the language defined by the "lang" [RFC9083] member. The default language is "en" if the "lang" [RFC9083] member is not specified. The reason is defined using an object with an **OPTIONAL** "type" field denoting a registered redacted reason (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 of the unredacted version of an RDAP lookup response:

```
{
  "rdapConformance": [
    "rdap_level_0"
  ],
  "objectClassName": "domain",
  "handle": "ABC123",
  "ldhName": "example.com",
  "secureDNS": {
    "delegationSigned": false
  },
  "notices": [
    {
      "title": "Terms of Use",
      "description": [
        "Service subject to Terms of Use."
      ],
      "links": [
        {
          "rel": "self",
          "href": "https://www.example.com/terms-of-use",
          "type": "text/html",
          "value": "https://www.example.com/terms-of-use"
        }
      ]
    }
  ],
  "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"
                  ]
                ]
              ]
            }
          ]
        },
        {
          "objectClassName": "entity",
          "handle": "XXXX",
          "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"
              ]
            ]
          ]
        },
        {
          "objectClassName": "entity",
          "handle": "YYYY",
          "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"
              ]
            ]
          ]
        },
        {
          "objectClassName": "entity",
          "handle": "ZZZZ",
          "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"
              ]
            ]
          ]
        },
        {
          "objectClassName": "entity",
          "handle": "WWWW",
          "roles": [
            "billing"
          ],
          "vcardArray": [
            "vcard",
            [
              [
                "version",
                {},
                "text",
                "4.0"
              ],
              [
                "fn",
                {},
                "text",
                "Billing User"
              ],
              [
                "email",
                {},
                "text",
                "billing.user@example.com"
              ]
            ]
          ]
        }
      ],
      "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"
      ]
    }
```

Figure 11: Unredacted RDAP Lookup Response

Example of the redacted version of an RDAP lookup response:

```
{
  "rdapConformance": [
    "rdap_level_0",
    "redacted"
  ],
  "objectClassName": "domain",
  "ldhName": "example.com",
  "secureDNS": {
    "delegationSigned": false
  },
  "notices": [
    {
      "title": "Terms of Use",
      "description": [
        "Service subject to Terms of Use."
      ],
      "links": [
        {
          "rel": "self",
          "href": "https://www.example.com/terms-of-use",
          "type": "text/html",
          "value": "https://www.example.com/terms-of-use"
        }
      ]
    }
  ],
  "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"
              ]
            ]
          ]
        }
      ]
    },
    {
      "objectClassName": "entity",
      "handle": "XXXX",
      "roles": [
        "registrant"
      ],
      "vcardArray": [
        "vcard",
        [
          [
            "version",
            {},
            "text",
            "4.0"
          ],
          [
            "fn",
            {},
            "text",
            ""
          ],
          [
            "adr",
            {},
            "text",
            [
              "",
              "",
              "",
              "",
              "QC",
              "",
              "Canada"
            ]
          ]
        ]
      ]
    },
    {
      "objectClassName": "entity",
      "handle": "YYYY",
      "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": {
        "description": "Registry Domain ID"
      },
      "prePath": "$.handle",
      "pathLang": "jsonpath",
      "method": "removal",
      "reason": {
        "description": "Server policy"
      }
    },
    {
      "name": {
        "description": "Registrant Name"
      },
      "postPath": "$.entities[?(@.roles[0]=='registrant')].
        vcardArray[1][?(@[0]=='fn')][3]",
      "pathLang": "jsonpath",
      "method": "emptyValue",
      "reason": {
        "description": "Server policy"
      }
    },
    {
      "name": {
        "description": "Registrant Organization"
      },
      "prePath": "$.entities[?(@.roles[0]=='registrant')].
        vcardArray[1][?(@[0]=='org')]",
      "pathLang": "jsonpath",
      "method": "removal",
      "reason": {
        "description": "Server policy"
      }
    },
    {
      "name": {
        "description": "Registrant Street"
      },
      "postPath": "$.entities[?(@.roles[0]=='registrant')].
        vcardArray[1][?(@[0]=='adr')][3][:3]",
      "pathLang": "jsonpath",
      "method": "emptyValue",
      "reason": {
        "description": "Server policy"
      }
    },
    {
      "name": {
        "description": "Registrant City"
      },
      "postPath": "$.entities[?(@.roles[0]=='registrant')].
        vcardArray[1][?(@[0]=='adr')][3][3]",
      "pathLang": "jsonpath",
      "method": "emptyValue",
      "reason": {
        "description": "Server policy"
      }
    },
    {
      "name": {
        "description": "Registrant Postal Code"
      },
      "postPath": "$.entities[?(@.roles[0]=='registrant')].
        vcardArray[1][?(@[0]=='adr')][3][5]",
      "pathLang": "jsonpath",
      "method": "emptyValue",
      "reason": {
        "description": "Server policy"
      }
    },
    {
      "name": {
        "description": "Registrant Email"
      },
      "prePath": "$.entities[?(@.roles[0]=='registrant')].
        vcardArray[1][?(@[0]=='email')]",
      "method": "removal",
      "reason": {
        "description": "Server policy"
      }
    },
    {
      "name": {
        "description": "Registrant Phone"
      },
      "prePath": "$.entities[?(@.roles[0]=='registrant')].
        vcardArray[1][?(@[1].type=='voice')]",
      "method": "removal",
      "reason": {
        "description": "Server policy"
      }
    },
    {
      "name": {
        "description": "Technical Name"
      },
      "postPath": "$.entities[?(@.roles[0]=='technical')].
        vcardArray[1][?(@[0]=='fn')][3]",
      "method": "emptyValue",
      "reason": {
        "description": "Server policy"
      }
    },
    {
      "name": {
        "description": "Technical Email"
      },
      "prePath": "$.entities[?(@.roles[0]=='technical')].
        vcardArray[1][?(@[0]=='email')]",
      "method": "removal",
      "reason": {
        "description": "Server policy"
      }
    },
    {
      "name": {
        "description": "Technical Phone"
      },
      "prePath": "$.entities[?(@.roles[0]=='technical')].
        vcardArray[1][?(@[1].type=='voice')]",
      "method": "removal",
      "reason": {
        "description": "Server policy"
      }
    },
    {
      "name": {
        "description": "Technical Fax"
      },
      "prePath": "$.entities[?(@.roles[0]=='technical')].
        vcardArray[1][?(@[1].type=='fax')]",
      "reason": {
        "description": "Client request"
      }
    },
    {
      "name": {
        "description": "Administrative Contact"
      },
      "prePath": "$.entities[?(@.roles[0]=='administrative')]",
      "method": "removal",
      "reason": {
        "description": "Refer to the technical contact"
      }
    },
    {
      "name": {
        "description": "Billing Contact"
      },
      "prePath": "$.entities[?(@.roles[0]=='billing')]",
      "method": "removal",
      "reason": {
        "description": "Refer to the registrant contact"
      }
    }
```

```
    ]
  }
```

Figure 12: Redacted RDAP Lookup Response

Example of the 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"
        }
      ]
    }
  ]
}
```

Figure 13: Unredacted RDAP Search Response

Example of the redacted version of an RDAP search response:

```
{
  "rdapConformance": [
    "rdap_level_0",
    "redacted"
  ],
  "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"
          },
          "prePath": "$.domainSearchResults[0].handle",
          "pathLang": "jsonpath",
          "method": "removal",
          "reason": {
            "type": "Server policy"
          }
        }
      ]
    },
    {
      "objectClassName": "domain",
      "ldhName": "example2.com",
      "links":[
        {
          "value":"https://example.com/rdap/domain/example2.com",
          "rel":"self",
          "href":"https://example.com/rdap/domain/example2.com",
          "type":"application/rdap+json"
        },
        {
          "value":"https://example.com/rdap/domain/example2.com",
          "rel":"related",
          "href":"https://example.com/rdap/domain/example2.com",
          "type":"application/rdap+json"
        }
      ],
      "redacted": [
        {
          "name": {
            "description": "Registry Domain ID"
          },
          "prePath": "$.domainSearchResults[1].handle",
          "pathLang": "jsonpath",
          "method": "removal",
          "reason": {
            "description": "Server policy"
          }
        }
      ]
    }
  ]
}
```

Figure 14: Redacted RDAP Search Response

5. JSONPath Considerations

JSONPath [RFC9535] is the default JSON path expression language. This section includes JSONPath considerations for clients and servers.

5.1. JSONPath Client Considerations

This section covers considerations for clients that receive responses from servers using JSONPath [RFC9535] to identify redacted RDAP fields with the "prePath", "postPath", or "replacementPath" member of redacted objects in the "redacted" member. The list of JSONPath client considerations include:

1. When the server is using the Redaction by Removal Method (Section 3.1) or the Redaction by Replacement Value Method (Section 3.4) with an alternative field value, the JSONPath expression of the "prePath" member will not resolve successfully with the redacted response. The client can key off the "name" member for display logic related to the redaction.

5.2. JSONPath Server Considerations

This section covers considerations for servers using JSONPath [RFC9535] to identify redacted RDAP fields with the "prePath", "postPath", or "replacementPath" 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 "$.domainSearchResults[0].handle" in a search response.
2. Validate a JSONPath expression with the non-redacted RDAP response when using the "prePath" member, where evaluating the expression results in returning the redacted field.
3. Reference the removed object field when redacting an entire object by the Redaction by Removal Method (Section 3.1), where all of the object's child fields are explicitly removed. An example is "$.entities[?(@.roles[0]=='administrative')]" for the entire "Administrative Contact".

4. Use multiple bases for the redaction of certain content. For example, if server policy is such that all administrative-role entities are redacted and all technical-role entities are redacted, then an entity having both the administrative role and the technical role could be redacted for two different reasons. In this situation, a server is required to include at least one "redacted" entry, but it should consider including a separate "redacted" entry for each applicable basis for redaction to clearly document the server policies that are relevant to redaction in each instance.
5. Reference the removed field when using the Redaction by Removal Method (Section 3.1). An example is "$.handle" for the "Registry Domain ID".
6. Reference index 0 of the jCard property array, which is the jCard "name" property, with a filter expression containing the name of the field when redacting a jCard field using the Redaction by Removal Method (Section 3.1). An example is "$.entities[?(@.roles[0]=='registrant')].vcardArray[1][?(@[0]=='email')]" for the "Registrant Email".
7. Reference the jCard field value or values redacted by array index 3 and greater when redacting a jCard field using the Redaction by Empty Value Method (Section 3.2). The jCard 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 property name. Servers can then systematically redact the jCard field value or values based on the JSONPath expressions, and clients will directly know which jCard 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 has registered the following value in the "RDAP Extensions" registry:

Extension Identifier: redacted

Registry Operator: Any

Specification: RFC 9537

Contact: IETF <iesg@ietf.org>

Intended Usage: This extension identifies the redacted fields in an RDAP response.

6.2. RDAP JSON Values Registry

Section 10.2 of [RFC9083] defines the "RDAP JSON Values" registry with predefined Type field values and a registration policy of Expert Review [RFC8126]. This specification defines three new Type field values that can be used to register predefined redacted name, reason, and expression language values. IANA has updated the "RDAP JSON Values" registry to accept these additional Type field values as follows:

"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.

"redacted expression language": Redacted expression language being registered. The registered redacted expression language is referenced using the "pathLang" field.

IANA has also listed this document as a reference for the "RDAP JSON Values" registry and has registered the following value:

Value: jsonpath

Type: redacted expression language

Description: JSON path expression language, as defined in RFC 9535.

Registrant: IETF

Contact Information: iesg@ietf.org

Reference: RFC 9537

7. Security Considerations

The extension described in this document does not provide any security services beyond those described by [RFC9083].

8. References

8.1. Normative References

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8.2. Informative References

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Authors' Addresses

James Gould
VeriSign, Inc.
12061 Bluemont Way
Reston, VA 20190
United States of America
Email: jgould@verisign.com
URI: http://www.verisign.com

David Smith
VeriSign, Inc.
12061 Bluemont Way
Reston, VA 20190
United States of America
Email: dsmith@verisign.com
URI: http://www.verisign.com

Jody Kolker
GoDaddy Inc.
14455 N. Hayden Rd., #219
Scottsdale, AZ 85260
United States of America
Email: jkolker@godaddy.com
URI: http://www.godaddy.com

Roger Carney
GoDaddy Inc.
14455 N. Hayden Rd., #219
Scottsdale, AZ 85260
United States of America
Email: rcarney@godaddy.com
URI: http://www.godaddy.com