**JSON Responses for the Industrial Internet Identifier Data Access
Protocol (IIIDAP)**
draft-mcd-identifier-access-responce-08

Status of this Memo

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Abstract

This document describes JSON data structures representing identifier
information maintained by Second-Level Nodes (SLN). These data
structures are used to form Industrial Internet Identifier Data
Access Protocol (IIIDAP) query responses.

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1. Introduction

This document describes responses in the JSON [RFC8259] format for
the queries as defined by the Industrial Internet Identifier Data
Access Protocol Query Format [IDENTIFIER-QUERY]. A communication

protocol for exchanging queries and responses is described in
[IDENTIFIER-HTTP].

1.1. Terminology and Definitions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
"SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this
document are to be interpreted as described in RFC 2119 [RFC2119].

The following list describes terminology and definitions used
throughout this document:

TLN: Top-Level Nodes

SLN: Second-Level Nodes

ELN: Enterprise-Level Nodes

member: data found within an object as defined by JSON [RFC8259].

object: a data structure as defined by JSON [RFC8259].

IIIDAP: Industrial Internet Identifier Data Access Protocol

1.2. Data Model

The data model for JSON responses is specified in five sections:

1. simple data types conveyed in JSON strings

2. data structures specified as JSON arrays or objects that are used
   repeatedly when building up larger objects

3. arrays of objects representing structured data corresponding to a
   search for multiple objects

4. the response to an error

Positive responses take two forms. A response to a lookup of a
single object yields a JSON object, which is the subject of the
lookup. A response to a search for multiple objects yields a JSON
object that contains an array of JSON objects that are the subject
of the search. In each type of response, other data structures are
present within the topmost JSON object.

2. Use of JSON

2.1. Naming

Clients of these JSON responses SHOULD ignore unrecognized JSON members in responses.

Clients processing JSON responses need to be prepared for members representing identifier data specified in this document to be absent from a response. In other words, servers are free to not include JSON members containing identifier data based on their own policies.

Finally, all JSON names specified in this document are case sensitive. Both servers and clients MUST transmit and process them using the specified character case.

3. Common Data Types

JSON [RFC8259] defines the data types of a number, character string, boolean, array, object, and null. This section describes the semantics and/or syntax reference for common, JSON character strings used in this document.

identifier: Take Handle Protocol [RFC3651] as an example, Identifier format of TLN is XX; identifier format of SLD is XX.YY; identifier format of ELD is XX.YY.ZZ; XX, YY, ZZ are UTF-8 [RFC3629] encoded character strings, which use any characters from the Unicode 2.0 standard except the ASCII character '/' (0x2F).

name: The maximum limit of name field is 255 ASCII characters.

picture: Pictures need to be Base64 encoded, then transferred via json.

id: The maximum limit of id field is 32 ASCII characters.

country codes: Where the identity of a geopolitical nation or country is needed, these identities are represented with the alpha-2 or two-character country code designation as defined in [ISO.3166.1988]. The alpha-2 representation is used because it is freely available, whereas the alpha-3 and numeric-3 standards are not.

   dates and times: The syntax for values denoting dates and times is
                     defined in [RFC3339].

   URIs: The syntax for values denoting a Uniform Resource
                     Identifier (URI) is defined by [RFC3986].

4. Common Data Structures

   This section defines common data structures used in responses.

4.1. IIIDAP Conformance

   The data structure named "iiidapConformance" is an array of strings,
   each providing a hint as to the specifications used in the
   construction of the response. This data structure appears only in
   the topmost JSON object of a response.

   An example iiidapConformance data structure:

   "iiidapConformance" :

   [

     "iiidap_level_0"

   ]

                            Figure 1

   The string literal "iiidap_level_0" signifies conformance with this
   specification.

4.2. Links

   The "links" array is found in data structures to signify links to
   other resources on the Internet. The relationship of these links is
   defined by the IANA registry described by [RFC8288].

   The following is an example of the link structure:

```
    {
      "value" : "http://example.com/context_uri",
      "rel" : "self",
      "href" : "http://example.com/target_uri",
      "hreflang" : [ "en", "ch" ],
```

```
        "title" : "title",
        "media" : "screen",
        "type" : "application/json"
      }
```


                              Figure 2

   The JSON name/values of "rel", "href", "hreflang", "title", "media",
   and "type" correspond to values found in Section 5 of [RFC8288]. The
   "value" JSON value is the context URI as described by [RFC8288]. The
   "href" JSON value MUST be specified. All other JSON values are
   OPTIONAL.

   This is an example of the "links" array as it might be found in an
   notice:

   "links" :
   [

       {

         "href" : "http://example.com",

         "title" : ""Terms of Use""

       }

   ]

                              Figure 3

4.3. Notices and Remarks

   The "notices" and "remarks" data structures take the same form. The
   notices structure denotes information about the service providing
   IIIDAP information and/or information about the entire response,
   whereas the remarks structure denotes information about the
   identifiers that contains it.

   Both are arrays of objects. Each object contains an optional "title"
   string representing the title of the object, an optional "type"
   string denoting a registered type of remark or notice, an array of
   strings named "description" for the purposes of conveying any
   descriptive text, and an optional "links" array as described in
   Section 4.2.

An example of the notices data structure:

```
"notices" :
[
  {
    "title" : "Terms of Use",
    "description" :
    [
      "Service subject to The Registry of the Moon's TOS.",
      "Copyright (c) 2020 LunarNIC"
    ],
    "links" :
    [
      {
        "value" : "http://example.net/entity/XXXX",
        "rel" : "alternate",
        "type" : "text/html",
        "href" : http://www.example.com/terms_of_use.html
      }
    ]
  }
]
```

Figure 4

It is the job of the clients to determine line breaks, spacing, and display issues for sentences within the character strings of the "description" array. Each string in the "description" array contains a single complete division of human-readable text indicating to clients where there are semantic breaks.

An example of the remarks data structure:

```
"remarks" :

[
  {
    "description" :
    [
      "She sells sea shells down by the sea shore.",
      "Originally written by Terry Sullivan."
    ]
  }
]
```

Figure 5

Note that objects in the "remarks" array may also have a "links" array.

While the "title" and "description" fields are intended primarily for human consumption, the "type" string contains a well-known value to be registered with TLN for programmatic use.

An example of the remarks data structure:

```
"remarks" :
[
  {
    "type" : "information truncated due to authorization",
    "description" :
    [
      "Some identifier data may not have been given.",
      "Use proper authorization credentials to see all of it."
    ]
  }
]
```

Figure 6

[4.4](). Language Identifier

This data structure consists solely of a name/value pair, where the name is "lang" and the value is a string containing a language identifier as described in [[RFC5646]()].

```
"lang" : "mn-Cyrl-MN"
```

[5](). Nodes

An identifier appears throughout this document and is an appropriate response for the /identifier/XXXX query defined in "Industrial Internet Identifier Data Access Protocol (IIIDAP) Query Format" [[IDENTIFIER-QUERY]()]. It represents the information of a SLN or ELN. All of these representations are expected to represent in JSON [[RFC8259]()].

The following is an example of an entity.

```
{
  "iiidapConformance" :
  [
    "iiidap_level_0"
  ],
  "notices" :
```

```
    [
      {
        "title" : "Content Removed",
        "description" :
        [
          "Without full authorization, content has been removed.",
          "Sorry, dude!"
        ],
        "links" :
        [
          {
            "value" : "http://example.net/identifier/86.100.1",
            "rel" : "alternate",
            "type" : "text/html",
            "href" : http://www.example.com/redaction_policy.html
          }
        ]
      }
    ],
    "lang" : "en",
    "identifier" : "86.100.1",
    "regTime" : "2017-09-12T08:57:32.0Z",
    "status" : "ok",
    "country" : "CN",
    "node" :
    {
      "name" : "mengniu"
      "nature" : "research institutions",
      "type" : "education",
      "subType" : "education",
      "address" : "No.52 Huayuan North Road, Haidian District Beijing,
  Beijing",
      "idNumber" : "84929141111234",
      "idType" : "other",
      "idPhoto" :
      {
        "mime": "data:image/jpeg;base64",
        "data":
  "/9j/4AAaebZJRgABAQEASABIAAD/ha6aYeDr18DWornKrlX+/sP/9k="
      },
     "introduction" : "hello, I am ok",
      "legalPerson" :
      [
       {
          "name" : "San Zhang",
          "idNumber" : "131187199507297827",
          "idType" : "resident ID card",
```

```
        "idPhoto" :
          {
          "mime": "data:image/jpeg;base64",
          "data":
  "/9j/4AAaebZJRgABAQEASABIAAD/ha6aYeDr18DWornKrlX+/sP/9k="
          }
        }
       ]
      "contact" :
      [
        {
       "name" : "Si Li",
          "phone" : "+86 100 0138 5070",
          "email" : test@caict.ac.cn
        }
       ]
      }
  ],
   "remarks" :
   [
     {
       "description" :
       [
         "She sells sea shells down by the sea shore.",
         "Originally written by Terry Sullivan."
       ]
     }
                         ]
  }
```

                              Figure 7

   An identifier of a SLN or ELN can contain the following members:

   o identifier -- a unique identifier of a SLN or ELN

   o regTime -- a string representing the registration time of the
     identifier of a node

   o status -- a string representing the registration status of the
     identifier. Optional values of the status MUST be defined by the
     TLN. For example, status of nodes can be classified as: "ok" and
     "hold".

   o country -- a string containing the two-character country code of
     the network

   o node -- an object representing a SLN or ELN, each containing the
     following values:

     * name -- a sting containing the name of a node

     * nature -- a string representing the nature of a node. The
   nature of a node (SLN or ELN) MUST be defined by the TLN. For
   example, according to their nature, nodes can be classified as:
   "government organs", "research institutions", "social
   organizations", and "enterprises and institutions".

     * type -- a string containing the business type of the node. The
   type of a node (SLN or ELN) MUST be defined by the TLN. For example,
   types of nodes can be classified as:
         "agriculture, forestry, animal husbandry and fishery",
         "the mining industry",
         "manufacturing",
         "electricity, heat, gas and water production and supply",
         "the construction industry",
         "wholesale and retail",
         "transportation, warehousing and postal services",
         "accommodation and catering",
         "information transmission, software and information technology
   services"
         "the financial sector",
         "the real estate industry",
         "leasing and business services",
         "scientific research and technology services",
         "water conservancy, environment and public facilities
   management",
         "residential services, repairs and other services",
         "education",
         "health and social work",
         "culture, sports and entertainment",
         "public administration, social security and social
   organization",
         and "the international organization".

     * subType -- a string containing the business subtype of the
   node. The Subtype of a node (SLN or ELN) MUST be defined by the TLN.
   For example, types of nodes can be classified as:
         "agricultural"

         "forestry"
         "animal husbandry"
         "fisheries"
         "agriculture, forestry, animal husbandry, fishing and

```
   auxiliary activities"
        "coal mining and washing industry"
        "oil and gas extraction"
        "ferrous metal mining industry"
        "nonferrous metal mining industry"
        "non-metallic mining industry"
        "mining professionals and auxiliary activities"
        "other mining"
        "agricultural and sideline food processing"
        "food manufacturing"
        "wine, beverage and refined tea manufacturing"
        "tobacco manufacturing"
        "textile industry"
        "textile and garment industry"
        "leather, fur, feathers and their products and footwear"
        "wood processing and water, bamboo, cane, palm, grass
   products"
        "furniture manufacturing"
        "paper and paper products industry"
        "the printing and recording media reproduction industry"
        "culture and education, the United States, sports and
   entertainment products" manufacturing"
        "oil, coal and other fuel processing industries"
        "chemical raw materials and chemical products manufacturing"
        "pharmaceutical manufacturing"
        "chemical fibre manufacturing"
        "rubber and plastic products"
        "non-metallic mineral products industry"
        "ferrous metal smelting and rolling industry"
        "non - ferrous metal smelting and rolling processing industry"
        "metal manufacturing"
        "general equipment manufacturing"
        "special equipment manufacturing"
        "automobile manufacturing"
        "manufacturing of railway, shipping, aerospace and other
   transport equipment"
        "electrical machinery and equipment manufacturing"
        "manufacturing of computers, communications and other
   electronic equipment"
        "instrument manufacturing"
        "other manufacturing"
        "waste resources comprehensive utilization industry"
        "metal products, machinery and equipment repair industry"
        "power and heat production and supply industries"
        "gas production and supply"
        "the production and supply of water"
        "housing construction industry"
```

```
        "civil engineering construction industry"
        "construction and installation industry"
        "architectural decoration, fitting-out and other construction
industries"
        "wholesaling"
        "retail"
        "transportation industry"
        "road transport"
        "marine transportation"
        "air transport"
        "pipeline transportation"
        "intermodal transport and transportation agencies"
        "loading, unloading, handling and warehousing"
        "the postal service"
        "the lodging industry"
        "the restaurant industry"
        "telecommunications, radio, television and satellite
transmission services"
        "internet and related services"
        "software and information technology services"
        "monetary and financial services"
        "capital market services"
        "the insurance industry"
        "other financial sectors"
        "the real estate industry"
        "rental"
        "business services"
        "research and experimental development"
        "professional technical services"
        "technology extension and application services"
        "water management"
        "ecological protection and environmental management industry"
        "public facilities management industry"
        "land management industry"
        "residential service"
        "motor vehicles, electronic products and household products
repair industry"
        "other services"
        "education"
        "health"
        "social work"
        "news and print industry"
        "radio, television, film and audio production"
        "arts and culture"
        "sports"
        "the entertainment industry"
        "organs of the communist party of China"
```

      "national institutions"
      "the people coordinate government and the democratic parties"
      "the social security"
      "mass organizations, social organizations and other member
   organizations"
      "grassroots self-government organizations"
      "the international organization"

   * address -- a string containing the address of the node

   * idNumber -- a string representing the unique legally binding
   identification number of a node

   * idType -- a string representing the type of the idNumber of
   the node. The type of the identification number of a node (SLN or
   ELN) MUST be defined by the TLN. For example, according to their
   type, identification number of a node can be classified as: "unified
   social credit code", and "other".

   * idPhoto -- an object containing the picture messages for the
   legally binding entity proof of a node. The file type of the image
   can be .jpg, .png, .bmf and .jpeg, and base64 encoding is required
   for the file upload.

   * introduce -- a string describing some business information of
   the node

   * legalPerson -- an object representing the legal person of the
   node

      + name -- a string containing the name of the legal person

      + idNumber -- a string representing the unique legally
   binding identification number of the legal person

      + idType -- a string representing the type of the idNumber of
   the legal person. The type of the identification number of a contact
   MUST be defined by the TLN. For example, according to their type,
   identification number of a contact can be classified as:
         "Chinese identity card", "Travel permit for Hong Kong and
   Macao residents to and from the mainland",
         "Permit for Taiwan residents to travel to and from the
   mainland",
         "Permanent resident identity CARDS for foreigners",
         "Hong Kong, Macao and Taiwan resident permit", and
   "passport".

    + idPhoto -- an object containing the picture messages for
   the legally binding entity proof of a legal person. The file type of
   the image can be .jpg, .png, .bmf and .jpeg, and base64 encoding is
   required for the file upload.

     * contact -- an object representing the of the node

      + name -- a string containing the name of the contact

       + phone -- a string containing the phone of the contact

      + email -- a string containing the Email of the contact

[6]. Error Response Body

   Some non-answer responses may return entity bodies with information
   that could be more descriptive.

   The basic structure of that response is an object containing an
   error code number (corresponding to the HTTP response code) followed
   by a string named "title" and an array of strings named
   "description".

   This is an example of the common response body.

```
   {
     "errorCode": 418,
     "title": "Your Beverage Choice is Not Available",
     "description":
     [
       "I know coffee has more ummppphhh.",
       "Sorry, dude!"
     ]
   }
```

                                Figure 8

   This is an example of the common response body with an
   iiidapConformance and notices data structures:

```
{
  "iiidapConformance" :
  [
    "iiidap_level_0"
  ],
  "notices" :
  [
```

```
  {
    "title" : "Beverage Policy",
    "description" :
    [
      "Beverages with caffeine for keeping horses awake."
    ],
    "links" :
    [
      {
        "value" : "http://example.net/identifier/86.100.1",
        "rel" : "alternate",
        "type" : "text/html",
        "href" : "http://www.example.com/redaction_policy.html"
      }
    ]
  }
],
"lang" : "en",
"errorCode": 418,
"title": "Your beverage choice is not available",
"description":
[
  "I know coffee has more ummppphhh.",
  "Sorry, dude!"
]
}
```

                            Figure 9

7. Responding to Help Queries

   The appropriate response to /help queries as defined by [IDENTIFIER-
   QUERY] is to use the notices structure as defined in Section 4.3.

   This is an example of a response to a /help query including the
   iiidapConformance data structure.

```
{
  "iiidapConformance" :
  [
    "iiidap_level_0"
  ],
  "notices" :
  [
    {
      "title" : "Authentication Policy",
      "description" :
```

```
          [
            "Access to sensitive data for users with proper
      credentials."
          ],
          "links" :
          [
            {
              "value" : "http://example.net/help",
              "rel" : "alternate",
              "type" : "text/html",
              "href" : "http://www.example.com/auth_policy.html"
            }
          ]
        }
      ]
    }
```

                            Figure 10

8. Responding To Searches

   [IDENTIFIER-QUERY] specifies the pattern of searches through the
   names of SLN and ELN. Responses to searches take the form of an
   array of identifier objects. These arrays are contained within the
   response object.

   The following is an elided example of a response to a /names search.

```
    {
      "iiidapConformance" :
      [
        "iiidap_level_0"
      ],
      ...
      "NodeSearchResults" :
      [
        {
          "identifier" : "86.100.1",
          "regTime" : "2019-12-12T08:57:32.0Z",
          "status" : "ok",
          ...
        },
        {
          "identifier" : "86.100.2",
          "regTime" : "2018-12-12T08:57:32.0Z",
          "status" : "ok",
          ...
```

```
      }
    ]
  }
```

                              Figure 11

9. Indicating Truncated Responses

   In cases where the data of a response needs to be limited or parts
   of the data need to be omitted, the response is considered
   "truncated". A truncated response is still valid JSON, but some of
   the results in a search set or some of the data in an object are not
   provided by the server. A server may indicate this by including a
   typed notice in the response object.

```
  {
    "iiidapConformance" :
    [
      "iiidap_level_0"
    ],
    "notices" :
    [
      {
        "title" : "Search Policy",
        "type" : "result set truncated due to authorization",
        "description" :
        [
         "Search results are limited to 25 per day per querying IP."
        ],
        "links" :
        [
          {
            "value" : "http://example.net/help",
            "rel" : "alternate",
            "type" : "text/html",
            "href" : "http://www.example.com/search_policy.html"
          }
        ]
      }
    ],
    "domainSearchResults" :
    [
      ...
    ]
  }
```

                              Figure 12

A similar technique can be used with a typed remark where a single
object has been returned and data in that object has been truncated.

The following is an elided example of a truncated data.

```
{
  "identifier" : "86.100.1",
  "regTime" : "2019-12-12T08:57:32.0Z",
  "status" : "ok",
  "node" :

    {
      "name" : "",
      "nature" : "research institutions",
      "type" : "education",
      ...
 "legalPerson" :
 {
   ...
 }
      "contact" :
 {
   ...
 }
    },

  "remarks" :
  [
    {
      "title" : "Data Policy",
      "type" : "object truncated due to unexplainable reason",
      "description" :
      [
        "Some of the data in this object has been removed."
      ],
      "links" :
      [
        {
          "value" : "http://example.net/help",
          "rel" : "alternate",
          "type" : "text/html",
          "href" : "http://www.example.com/data_policy.html"
        }
      ]
    }
  ]
```

```
}
```

                              Figure 13

10. IANA Considerations

10.1. IIIDAP JSON Media Type Registration

This specification will register the "application/iiidap+json" media type.

Type name: application

Subtype name: iiidap+json

Required parameters: n/a

Encoding considerations: See Section 3.1 of [RFC6839].

Security considerations: The media represented by this identifier does not have security considerations beyond that found in Section 6 of [RFC8259].

Interoperability considerations: There are no known interoperability problems regarding this media format.

Work in progress specification: draft-mcd-identifier-access-responce-00

Applications that use this media type: Implementations of the Industrial Internet Identifier Data Access Protocol (IIIDAP).

Intended usage: COMMON

Restrictions on usage: none

Author: Chendi Ma

Change controller: IETF

Provisional Registration: No (upon publication of this draft)

11. Security Considerations

This specification model information serialized in JSON format. As JSON is a subset of JavaScript, implementations are advised to

follow the security considerations outlined in Section 6 of
[RFC8259] to prevent code injection.

Though not specific to JSON, IIIDAP implementers should be aware of
the security considerations specified in [IDENTIFIER-HTTP] and the
security requirements and considerations in [IDENTIFIER-SECURITY].

Finally, service operators should be aware of the privacy mechanisms
noted in Section 13.

12. Internationalization Considerations

12.1. Character Encoding

The default text encoding for JSON responses in IIIDAP is UTF-8
[RFC3629], and all servers and clients MUST support UTF-8.

12.2. URIs and IRIs

[IDENTIFIER-HTTP] defines the use of URIs and IRIs in IIIDAP.

13. Privacy Considerations

This specification suggests some of values to identifier information
that has been marked as private and/or has been removed or obscured,
except:

o identifer

o name of a node

o type of a node

o introduce of a node

A few of the status values indicate that there are privacy concerns
associated with the identifier object. The following status codes
SHOULD be used to describe data elements of a response when
appropriate:

o private -- The object is not be shared in query responses, unless
   the user is authorized to view this information.

o removed -- Data elements within the object have been collected
   but have been omitted from the response. This option can be used
   to prevent unauthorized access to associated identifier objects
   without the need to mark them as private.

o obscured -- Data elements within the object have been collected,
   but the response value has been altered so that values are not
   easily discernible. A value changed from "1212" to "XXXX" is an
   example of obscured data. This option may reveal privacy
   sensitive information and should only be used when data
   sensitivity does not require a more protective option like
   "private" or "removed".

14. References

References to IIIDAP are subject to the latest edition.

14.1. Normative References

[ISO.3166.1988]
          International Organization for Standardization, "Codes for
          the representation of names of countries, 3rd edition",
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          Internet: Timestamps", RFC 3339, July 2002,
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          10646", STD 63, RFC 3629, November 2003,
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[RFC5646] Phillips, A. and M. Davis, "Tags for Identifying
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