

INTERNATIONAL DATA SPACES

IDS COMMUNICATION GUIDE V2

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MOTIVATION

Experience has shown that **interoperability** is crucial but hard to achieve without a normative specification.



TASK FORCE



interested
IDSA members



iterative process



international
standard

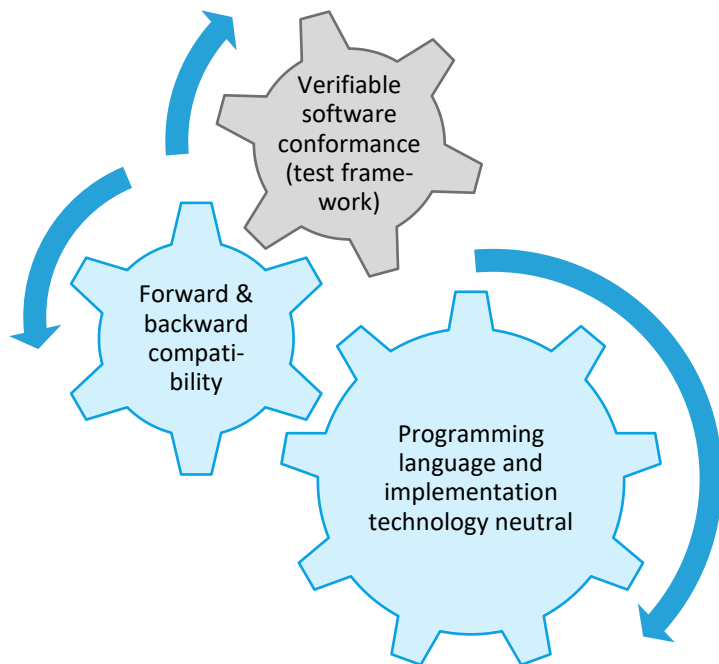


weekly
meeting



GitHub
repository

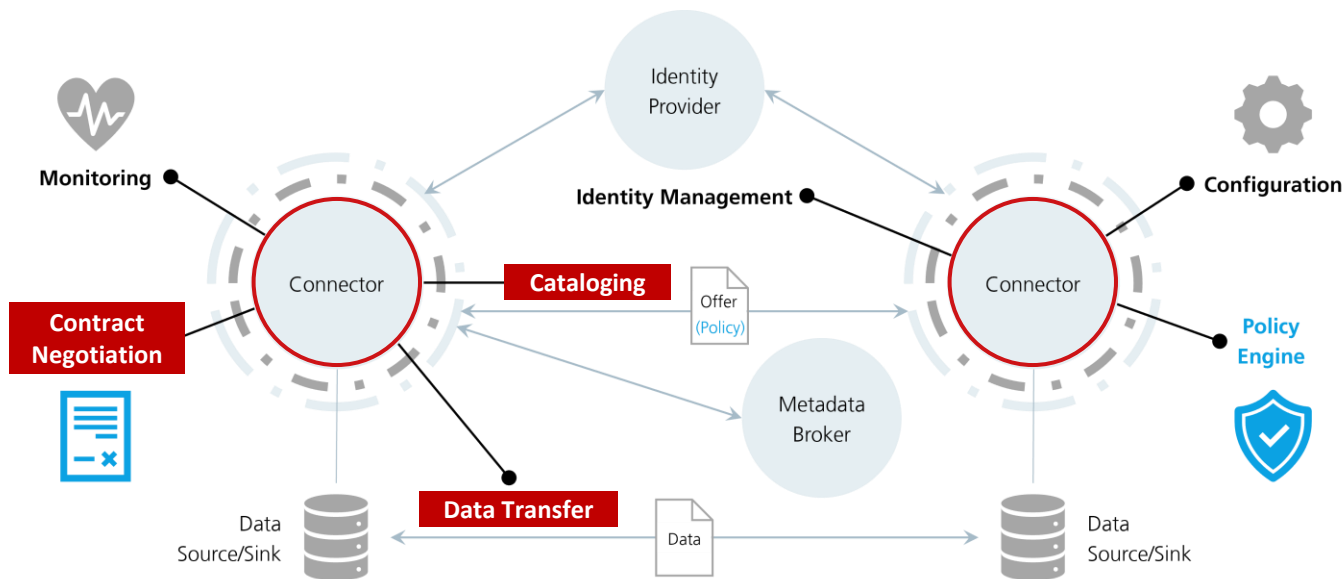
SCOPE



Out-of-scope

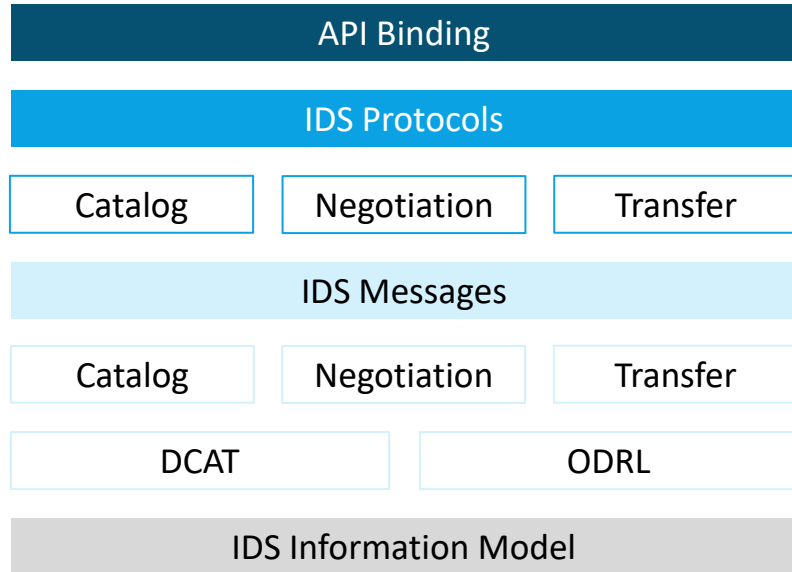
- Governance, certification, or trust aspects
- Cross-data space communication
- Auditing and clearing house
- Custom semantic models and vocabularies

FOCUS





VISION



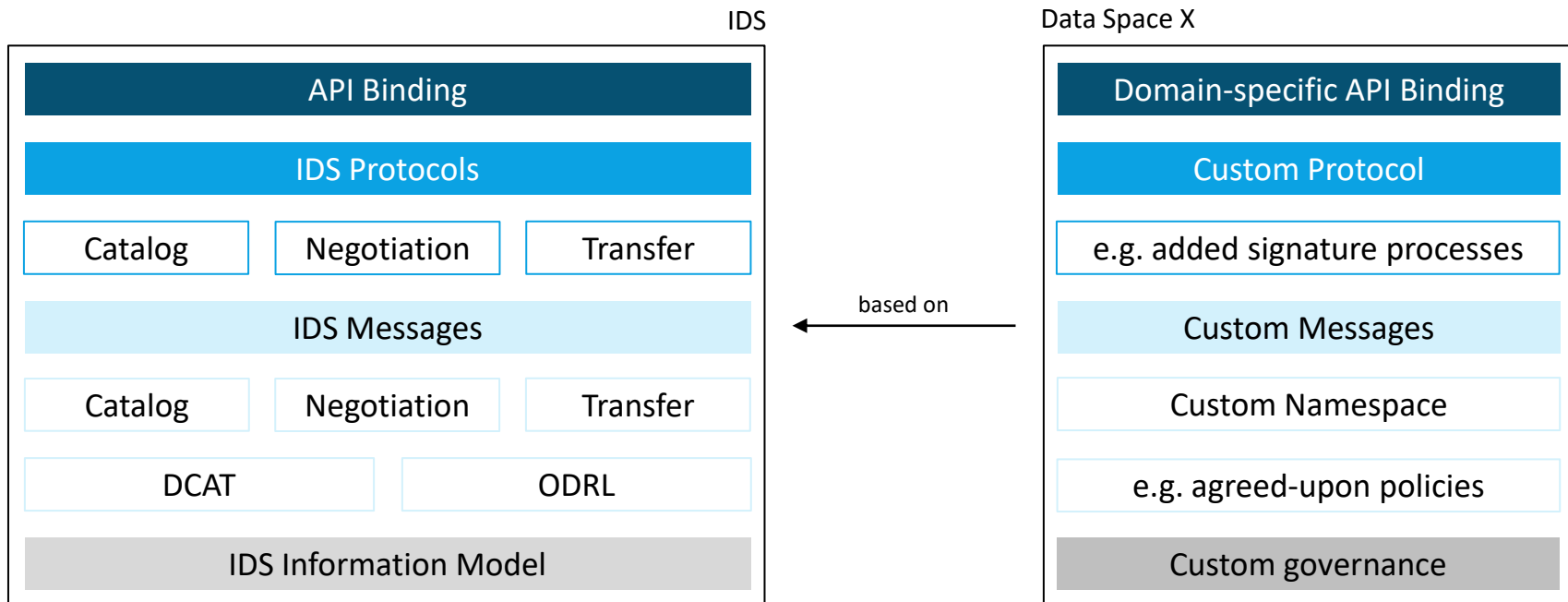
The binding of **messages** and **protocols** to transports.

The state machines for **message** flows between participants.

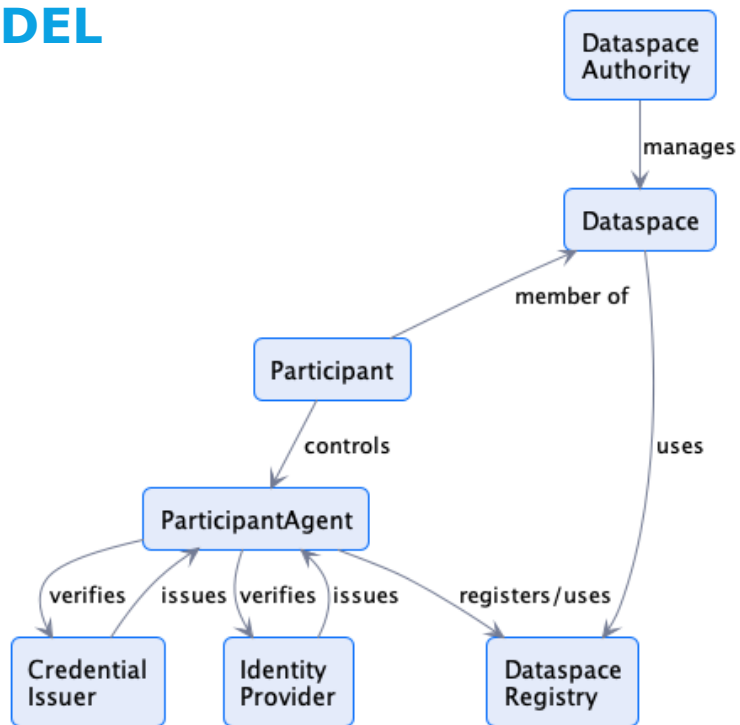
The exchanged information and their schemas.

The main concepts in a dataspace and their interrelationships.

ADOPTION



INFORMATION MODEL





IDS PROTOCOLS

CATALOG PROTOCOL

CATALOG PROTOCOL OVERVIEW

- Request: CatalogRequestMessage (sent by consumer)
- Response: DCAT Catalog (sent by provider, cataloging service)

```
{
  "@context": "https://w3id.org/idsa/v5/context.json",
  "@type": "ids:CatalogRequest"
  "ids:filter": {}
}
```

Queries and Filter Expressions

- May support queries or filter expressions as an implementation-specific feature
- Client-side querying: periodically crawling, caching, querying against local storage

Replication Protocol

- Design for federated services without the need for a replication protocol
- Each consumer is responsible for issuing requests to 1..N catalog services

Security

- It is expected (not required) that catalog services implement access control
- Allowing different security mechanisms (part of the catalog binding specification)

Catalog Broker

- Trusted access to 1..N upstream catalog services and advertises their catalogs
- Expected to honor upstream access control requirements

CATALOG PROTOCOL

HTTPS BINDING

Mandatory Path Bindings (provided by actor P = provider or C = consumer)

- POST https://BASE_URL/catalog/request (P)

Authorization

- HTTP Authorization header with a token
- Content of the token is undefined (e.g., OAuth2, Web DID, or other)

Pagination

- Using [Web Linking](#) and the HTTP Link header
- Link header will contain URLs for navigating to previous and subsequent results

Asynchronous Interactions

- Optional support for asynchronous callbacks for the catalog response
- Require adding a *callbackAddress* property and an *@id* to the request

```
Link: <https://provider.com/catalog?page=2&per_page=100>; rel="next"
{
  "@context": {
    "dcat": "http://www.w3.org/ns/dcat/"
  },
  "@type": "dcat:Catalog"
  ...
}
```

Second page response:

```
Link: <https://provider.com/catalog?page=1&per_page=100>; rel="previous"
Link: <https://provider.com/catalog?page=3&per_page=100>; rel="next"
{
  "@type": "dcat:Catalog"
  ...
}
```

Last page response:

```
Link: <https://provider.com/catalog?page=2&per_page=100>; rel="previous"
{
  "@type": "dcat:Catalog"
  ...
}
```



CATALOG PROTOCOL

VOCABULARY – DCAT MAPPING

Asset Entry

- Is a [DCAT Dataset](#)
- May have 1..N dcat:hasPolicy (ODRL offer)
- Offers must NOT contain any target
- The target of an offer is the asset associated with the containing asset entry

Distribution

- An asset may contain 1..N [DCAT Distributions](#)
- Must have at least one *DataService*

DataService

- May specify an IDS service endpoint (e.g., Connector)
- Specifies the endpoint for initiating a negotiation/data transfer

```

1  {
2      "@context": "https://w3id.org/idsa/v5/context.json",
3      "@id": "http://provider.com/catalog1/dataset1/",
4      "@type": "dcat:Dataset",
5      "dct:title" : "IDS Dataset #1",
6      "dct:description": [ {
7          "@language": "en",
8          "@value": "This is the number 1 data asset of the IDS. The consumer must be a TRUST_PLUS certified connector."
9      }, {
10         "@language": "de",
11         "@value": "Dies ist das Nummer 1 Data Asset im IDS. Der Consumer muss ein TRUST_PLUS zertifizierter Connector sein."
12     } ],
13     "dcat:keyword": [
14         "high value data",
15         "example"
16     ],
17     "dcat:hasPolicy": {
18         "@type": "odrl:Offer",
19         "@id": "https://provider.com/edc/offer/1",
20         "odrl:permission": [ {
21             "odrl:action": {"@id": "odrl:use"},
22             "odrl:constraint" : [ {
23                 "odrl:leftOperand": "ids:SECURITY_PROFILE",
24                 "odrl:operand": "odrl>equals",
25                 "odrl:rightOperand": "ids:TRUST_PLUS"
26             } ]
27         } ],
28         "odrl:prohibition": [ {
29             "odrl:action": {"@id": "odrl:distribute"}
30         } ]
31     },
32     "dcat:distribution": [ {
33         "@type": "dcat:Distribution",
34         "dct:title" : "Distribution#1",
35         "dct:description": "This is a distribution which provides the data via a HTTP REST API.",
36         "dcat:keyword": [
37             "HTTP",
38             "REST"
39     ],

```

```

40     "ids:transportType": {
41         "@id": "ids:HTTP_REST"
42     },
43     "dcat:accessService": [ {
44         "@type": [ "dcat:DataService", "ids:NEGOTIATION_SERVICE" ],
45         "dcat:endpointURL": {
46             "@type": "xsd:anyURI",
47             "@value": "https://provider.com/connector/negotiation"
48         }
49     }, {
50         "@type": [ "dcat:DataService", "ids:TRANSFER_SERVICE" ],
51         "dcat:endpointURL": {
52             "@type": "xsd:anyURI",
53             "@value": "https://provider.com/connector/transfer"
54         }
55     } ]
56 }, {
57     "@type": "dcat:Distribution",
58     "dct:title" : "Distribution#2",
59     "dct:description": "This is another distribution using an S3 API.",
60     "dcat:keyword": [
61         "S3",
62         "public"
63     ],
64     "ids:transportType": {
65         "@id": "ids:S3"
66     },
67     "dcat:accessService": [ {
68         "@type": [ "dcat:DataService", "ids:NEGOTIATION_SERVICE" ],
69         "dcat:endpointURL": {
70             "@type": "xsd:anyURI",
71             "@value": "https://provider.com/connector/negotiation"
72         }
73     }, {
74         "@type": [ "dcat:DataService", "ids:TRANSFER_SERVICE" ],
75         "dcat:endpointURL": {
76             "@type": "xsd:anyURI",
77             "@value": "https://provider.com/connector/transfer"
78         }
79     } ]
80 } ]
81 }

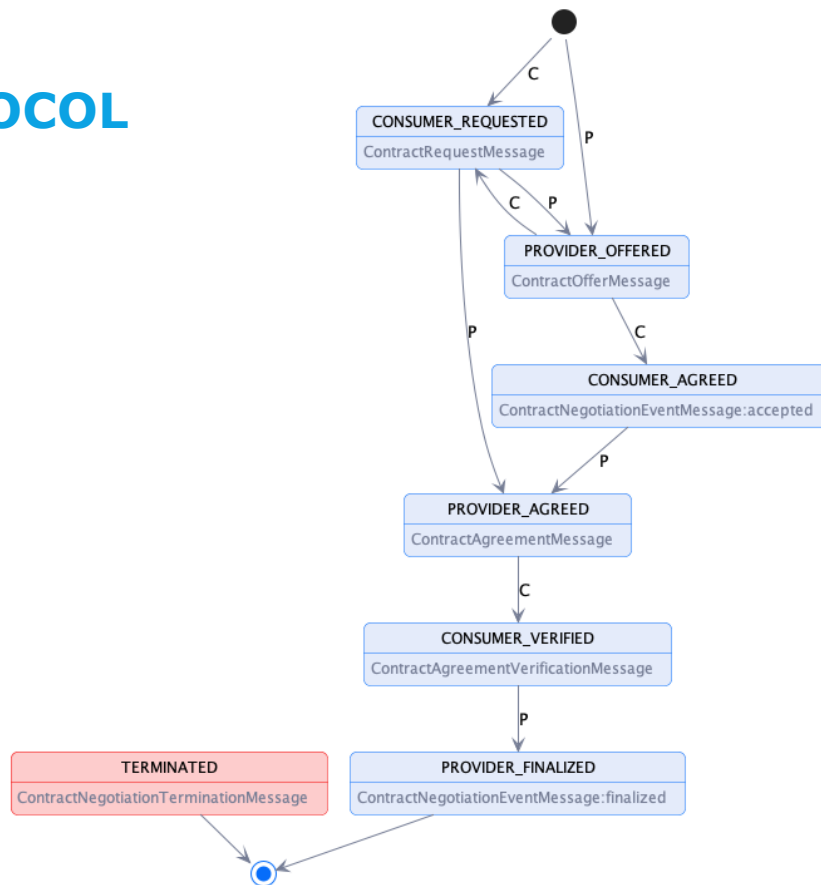
```



IDS PROTOCOLS

NEGOTIATION PROTOCOL

NEGOTIATION PROTOCOL STATE MACHINE

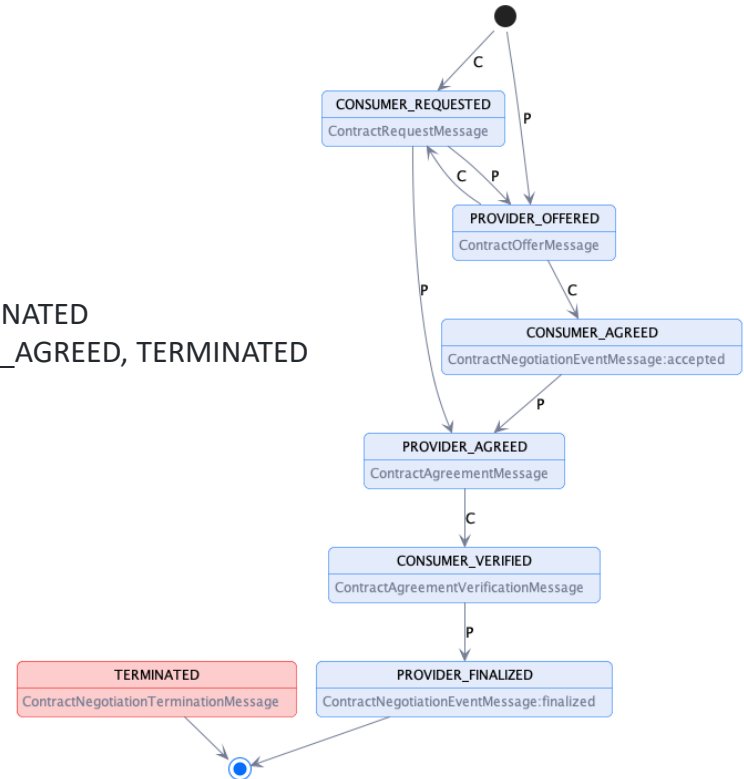


NEGOTIATION PROTOCOL IDS MESSAGES

Messages

- ContractRequestMessage → CONSUMER_REQUESTED, TERMINATED
- ContractAgreementMessage → PROVIDER_AGREED, TERMINATED
- ContractAgreementVerificationMessage → CONSUMER_VERIFIED, TERMINATED
- ContractNegotiationEventMessage → PROVIDER_FINALIZED, CONSUMER_AGREED, TERMINATED
- ContractNegotiationTerminationMessage → TERMINATED
- ContractNegotiationErrorMessage → TERMINATED

TODO: Signature process (define checksum calculations etc.)



NEGOTIATION PROTOCOL

HTTPS BINDING

Mandatory Path Bindings (provided by actor P = provider or C = consumer)

- GET https://BASE_URL/negotiations/:id (P)
- POST https://BASE_URL/negotiations/request (P)
- POST https://BASE_URL/negotiations/:id/request (P)
- POST https://BASE_URL/negotiations/:id/events (P/C)
- POST https://BASE_URL/negotiations/:id/agreement/verification (P)
- POST https://BASE_URL/negotiations/:id/termination (P)
- POST https://BASE_URL/negotiations/:id/offers (C)
- POST https://BASE_URL/negotiations/:id/agreement (C)

Format: Request & response messages must use the application/json media type

Authorization (optional)

- Include data as specified by an authorization protocol (e.g., OAuth2)
- No mandate for use of a particular authorization standard

```
{
  "@context": "https://w3id.org/idsa/v5/context.json",
  "@type": "ids:ContractNegotiation"
  "@id": "urn:uuid:dcbf434c-eacf-4582-9a02-f8dd50120fd3",
  "ids:state" : "CONSUMER_REQUESTED"
}
```

POST https://connector.provider.com/negotiations/request

Authorization: ...

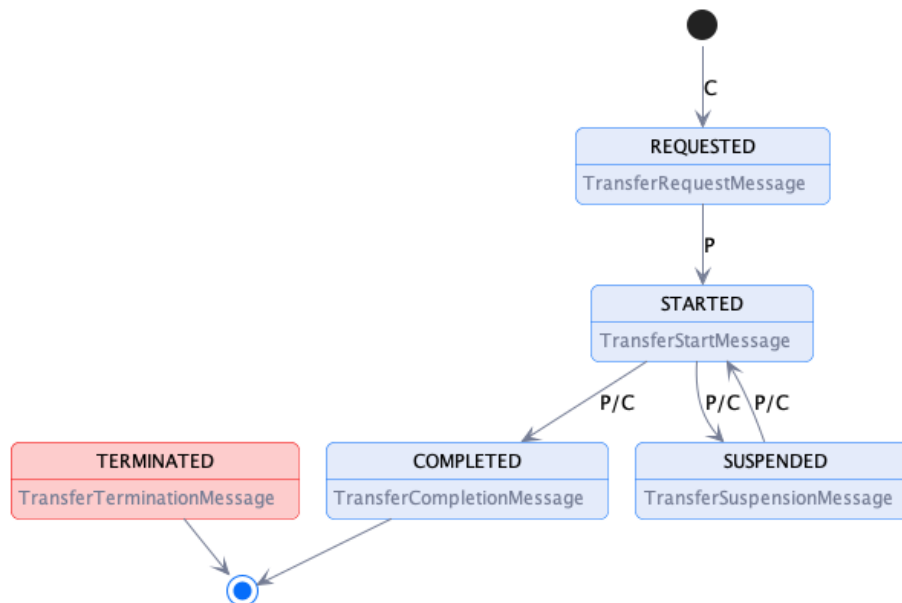
```
{
  "@context": "https://w3id.org/idsa/v5/context.json",
  "@type": "ids:ContractRequest"
  "@id": "urn:uuid:dcbf434c-eacf-4582-9a02-f8dd50120fd3",
  "ids:dataSet": "urn:uuid:3dd1add8-4d2d-569e-d634-8394a8836a88",
  "ids:offerId": "urn:uuid:2828282:3dd1add8-4d2d-569e-d634-8394a8836a88",
  "ids:callbackAddress": "https://....."
}
```



IDS PROTOCOLS

TRANSFER PROTOCOL

TRANSFER PROTOCOL STATE MACHINE



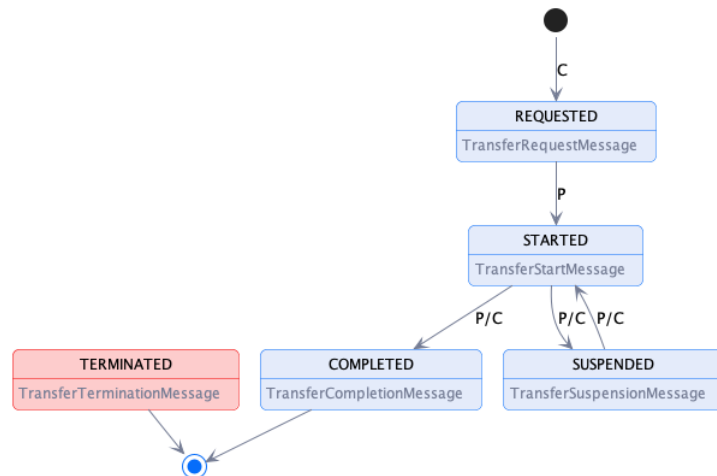
TRANSFER PROTOCOL IDS MESSAGES

Data Transfer Types

- Push vs. Pull (always initiated by consumer)
- Finite vs. non-finite data

Messages

- TransferRequestMessage → REQUESTED
- TransferStartMessage → STARTED
- TransferSuspensionMessage → SUSPENDED
- TransferCompletionMessage → COMPLETED
- TransferTerminationMessage → TERMINATED
- TransferErrorMessage → TERMINATED



TRANSFER PROTOCOL

HTTPS BINDING

Mandatory Path Bindings (provided by actor **P** = provider or **C** = consumer)

- GET https://BASE_URL/transfer-processes/:id (P)
- POST https://BASE_URL/transfer-processes/request (P)
- POST https://BASE_URL/transfer-processes/:id/start (P/C)
- POST https://BASE_URL/transfer-processes/:id/completion (P/C)
- POST https://BASE_URL/transfer-processes/:id/termination (P/C)
- POST https://BASE_URL/transfer-processes/:id/suspension (P/C)

Format: Request & response messages must use the application/json media type

Authorization (optional)

- Include data as specified by an authorization protocol (e.g., OAuth2)
- No mandate for use of a particular authorization standard

```
{
  "@context": "https://w3id.org/idsa/v5/context.json",
  "@id": "urn:uuid:71f8dfab-9337-4e9d-a4c7-524e04443f16",
  "@type": "ids:TransferProcess",
  "ids:correlationId": "urn:uuid:4a3ad65e-d78a-4200-a666-fc47aec32f2f",
  "ids:state": "REQUESTED"
}
```

POST https://connector.provider.com/transfer-processes/request

Authorization: ...

```
{
  "@context": "https://w3id.org/idsa/v5/context.json",
  "@id": "urn:uuid:4a3ad65e-d78a-4200-a666-fc47aec32f2f",
  "@type": "ids:TransferRequestMessage",
  "ids:agreementId": "urn:uuid:e8dc8655-44c2-46ef-b701-4cfffcd2faa44",
  "dct:format": "ids:s3+push",
  "dataAddress": {},
  "ids:callbackAddress": "https://....."
}
```



THANK YOU.
ANY QUESTIONS OR FEEDBACK?



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DATA BUSINESS

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