TAXII™ Version 1.1.1. Part 5: Default Query

Committee Specification 01

05 May 2016

Specification URIs

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Additional artifacts:

This prose specification is one component of a Work Product that also includes:

- *TAXII Version 1.1.1. Part 1: Overview*. http://docs.oasis-open.org/cti/taxii/v1.1.1/cs01/part1-overview/taxii-v1.1.1-cs01-part1-overview.html
- *TAXII Version 1.1.1. Part 2: Services*. http://docs.oasis-open.org/cti/taxii/v1.1.1/cs01/part2-services/taxii-v1.1.1-cs01-part2-services.html
- *TAXII Version 1.1.1. Part 3: HTTP Protocol Binding*. http://docs.oasis-open.org/cti/taxii/v1.1.1/cs01/part3-http/taxii-v1.1.1-cs01-part3-http.html
- *TAXII Version 1.1.1. Part 4: XML Message Binding*. http://docs.oasis-open.org/cti/taxii/v1.1.1/cs01/part4-xml/taxii-v1.1.1-cs01-part4-xml.html
- *TAXII Version 1.1.1. Part 5: Default Query* (this document). http://docs.oasis-open.org/cti/taxii/v1.1.1/cs01/part5-query/taxii-v1.1.1-cs01-part5-query.html
- XML schemas: http://docs.oasis-open.org/cti/taxii/v1.1.1/cs01/schemas/

Related work:

This specification replaces or supersedes:

- *The TAXII Default Query Specification Version 1.0*. http://taxiiproject.github.io/releases/1.1/TAXII_Default_Query_Specification.pdf.

This specification is related to:

- *TAXII Content Binding Reference.* http://taxiiproject.github.io/releases/1.1/TAXII_ContentBinding_Reference_v3.pdf

Declared XML namespaces:

- http://docs.oasis-open.org/cti/ns/taxii/xml/binding-1.1.1
- http://docs.oasis-open.org/cti/ns/taxii/default-query-1.1.1

Abstract:

This document describes the TAXII default query.

Status:

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Table of Contents

1 Introduction

The TAXII™ Services Specification 1.1.1 defines the TAXII Query capability, which is an extension point within TAXII. This document defines the Default TAXII Query, which is one implementation of the TAXII 1.1.1 Query extension point.

1.1 The Default TAXII™ Query Specification

This specification defines the Default TAXII Query, which is one extension of TAXII Query. As required by the TAXII Services Specification, this document defines structures to be used for TAXII Query (the Query Structure and Query Information Structure) as well as semantics and workflows for processing those structures.

The Default TAXII Capability Specification defines the Default TAXII Query structure, processing rules for the Default TAXII Query, an XML representation of the Default TAXII Query structure to be used in conjunction with the TAXII 1.1.1 XML Message Binding, and concepts fundamental to the Default TAXII Query.

1.1.1 TAXII™ Query Format ID for XML

The TAXII Query Format ID for the version of the Default TAXII Query described in this specification is:

```
urn:oasis:cti:taxii:query:1.1.1
```

1.2 Terminology

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]**.

1.3 Normative References

[RFC 2119] Bradner, S., “Key words for use in RFCs to Indicate Requirement Levels”, BCP 14, RFC 2119, March 1997. http://www.ietf.org/rfc/rfc2119.txt.

1.4 Terms and Definitions

This document uses the Terms and Definitions defined in the TAXII Services Specification and TAXII Overview. In addition, this document defines terms that are assigned a specific meaning within this specification.

1.4.1 Default TAXII™ Query Terms

Capability Module – A defined set of relationships (e.g., equals, greater than) that can be used in specifying selection criteria.

Targeting Expression – An expression that specifies the target region of a record for searching.

Targeting Expression Vocabulary – A defined set of vocabulary items to be used in a Targeting Expression.

Node – One vocabulary item in a Targeting Expression Vocabulary.

2 Status Types

This document defines three Status Types to use when responding with an error condition related to a TAXII Default Query. This section contains three tables: one table describing the new status types (akin to the 'TAXII Status Types' table in the TAXII Services Specification 1.1.1); one table describing the XML representation of the Status Types (akin to the 'Defined Status Types' table in the XML Message Binding Specification 1.1.1); and one table describing the XML representation of the Status Detail for each Status Type (akin to the 'Defined <Status_Detail>/<Detail> Names and Values table in the XML Message Binding Specification 1.1.1).

Table 1 - Status Types for TAXII™ Default Query

<table>
<tr><th>Status Type</th><th>Description</th></tr>
<tr><td>Unsupported Capability Module</td><td>The requester specified a Capability Module that is not supported by the TAXII Service.
<table>
<tr><th>Status Detail Name</th><th>Status Detail Value</th></tr>
<tr><td>Supported Capability Modules</td><td>A list of acceptable Capability Modules.</td></tr>
</table></td></tr>
<tr><td>Unsupported Targeting Expression</td><td>The requester specified a Targeting Expression that is not supported by the TAXII Service.
<table>
<tr><th>Status Detail Name</th><th>Status Detail Value</th></tr>
<tr><td>Preferred Scope</td><td>This field contains a Targeting Expression that identifies a subset of valid Targeting Expressions. The query provider is able to provide a response more rapidly to requests that contain a query when Targeting Expressions in the Preferred Scope are used. For more information on Preferred Scope, see Section 3.2.1.1.</td></tr>
<tr><td>Allowed Scope</td><td>This field contains a Targeting Expression that identifies a subset of valid Targeting Expressions. The query provider is able to provide a response to requests that contain a query when Targeting Expressions in the Allowed Scope are used. For more information on Allowed Scope, see Section 3.2.1.1.</td></tr>
</table></td></tr>
<tr><td>Unsupported Targeting Expression Vocabulary</td><td>The requester specified a Targeting Expression Vocabulary that was not supported.
<table>
<tr><th>Status Detail Name</th><th>Status Detail Value</th></tr>
<tr><td>Supported Targeting Expression IDs</td><td>A list of acceptable Targeting Expression IDs. Each Targeting Expression ID indicates an acceptable Targeting Expression Vocabulary.</td></tr>
</table></td></tr>
</table>

Table 2 – Defined Status Types for TAXII™ Default Query

`@status_type` Value	Error	`<Status_Detail>` name-values

	Status Type	Name	Reqd?
UNSUPPORTED_CAPABILITY_MODULE	Unsupported Capability Module	CAPABILITY_MODULE	No
UNSUPPORTED_TARGETING_EXPRESSION	Unsupported Targeting Expression	PREFERRED_SCOPE	Yes*
		ALLOWED_SCOPE	
UNSUPPORTED_TARGETING_EXPRESSION_ID	Unsupported Targeting Expression ID	TARGETING_EXPRESSION_ID	No

*At least one of PREFERRED_SCOPE or ALLOWED_SCOPE MUST be present. Both MAY be present. All PREFERRED_SCOPE Status Details should come before all ALLOWED_SCOPE Status Details.

Table 3 - Defined <Status_Detail>/<Detail> Names and Values for TAXII™ Default Query

@status_type Value	<Detail> @name	<Detail> Value
UNSUPPORTED_CAPABILITY_MODULE	CAPABILITY_MODULE	An XML AnyURI indicating a supported Capability Module. This field may be repeated.
UNSUPPORTED_TARGETING_EXPRESSION	PREFERRED_SCOPE	An XML string containing a Targeting Expression
UNSUPPORTED_TARGETING_EXPRESSION	ALLOWED_SCOPE	An XML string containing a Targeting Expression.
UNSUPPORTED_TARGETING_EXPRESSION_ID	TARGETING_EXPRESSION_ID	An XML AnyURI indicating a supported Targeting Expression Vocabulary. This field may be repeated.

3 TAXII™ Default Query

TAXII Default Query allows a Consumer to provide a Producer with selection criteria to use when fulfilling requests for data from a TAXII Data Collection. This section defines The TAXII Default Query.

3.1 Query Structure

The following table details the query structure of the Default Query Structure. This structure is used within the Query field of a Poll Request and the Query field of a Manage Collection Subscription Request with an Action of SUBSCRIBE. This structure contains the criteria that content should be evaluated against when fulfilling a subscription or Poll Request.

Table 4 – Default Query Structure

Name	Required?	Multiple?	Description
Default Query			This field contains a TAXII Default Query.
Targeting Expression Vocabulary ID	Yes	No	This field identifies the Target Expression Vocabulary used in this query. All Target fields in this query MUST use the identified vocabulary. If the TAXII Service does not support this Targeting Expression ID, a Status Message with a status of 'Unsupported Targeting Expression Vocabulary' SHOULD be returned.
Criteria	Yes	No	This field contains the criteria. If the criteria evaluates to true for a piece of content, that content is said to match the query.
Operator	Yes	No	This field indicates the logical operator that should be applied to child Criteria and Criterion to determine whether content matches this query. Valid values are "and" and "or". - "And" indicates that this Criteria evaluates to True if and only if all child Criteria and Criterion evaluate to True. - "Or" indicates that this Criteria evaluates to True if any child Criteria or Criterion evaluate to True.
Criteria	At least one of either.	Yes	This field contains a Criteria. The subfields of this Criteria are the same as the parent Criteria (e.g., this is a recursive field), though they are not listed here.

Name	Required ?	Multiple?	Description
Criterion	Can be multiple of both. All criteria must appear before all criterion.	Yes	This field contains the criterion.
Negate	No	No	This field indicates whether the final result of the Criterion should be negated. If absent, treat this field as “false”.
Target	Yes	No	This field contains the Targeting Expression for this Criterion, identifying the region of the record that is being targeted. The Targeting Expression MUST only use Nodes from the specified Target Expression Vocabulary. If the TAXII Service does not support this Targeting Expression, a Status Message with a status of ‘Unsupported Targeting Expression’ SHOULD be returned.
Test	Yes	No	This field contains the test for the region of the record identified by the Target.
Capability ID	Yes	No	Contains the Capability ID, which identifies a Capability Module. If the TAXII Service does not support this Capability Module, a Status Message with a status of ‘Unsupported Capability Module’ SHOULD be returned.
Relationship	Yes	Yes	Contains the relationship. This value MUST be defined by the Capability Module identified by the Capability ID.
Parameter	-	-	Contains the parameter(s) for this test, which take for form of a name-value pair. Whether a parameter is required, the permissible values and their meanings, and whether multiple parameters of the same name are permitted is defined by the Capability Module.
Name	Yes	No	Contains the name of the parameter.

3.1.1 XML Representation

This section defines the XML representation of the Query Structure. This structure is intended for use with the TAXII XML Message Binding 1.1.1 (urn:oasis:cti:taxii:xml:1.1.1).

The XML Namespace for this representation is: http://docs.oasis-open.org/cti/ns/taxii/default-query-1.1.1

Table 5 - XML Representation of TAXII™ Default Query

XML Name	Data Model Name	#	Description
<Default_Query>	Default Query	1	The element name indicates that this is a TAXII Default Query. Its body MUST consist of only the indicated XML Fields.
@targeting_expression_id	Targeting Expression ID	1	An XML AnyURI indicating the Targeting Expression Vocabulary that will be used in this query's Target field(s).
<Criteria>	Criteria	1	An XML element. Its body consists only of the indicated XML fields.
@operator	Operator	1	An XML string containing an operator. Must be one of "AND" or "OR".
<Criteria>	Criteria	1-n	An XML element. This element MUST consist only of the indicated XML fields. The subfields of this Criteria are the same as the parent Criteria (e.g., this is a recursive field), though they are not listed here.
<Criterion>	Criterion		An XML element. This element MUST consist only of the indicated XML fields.
@negate	Negate	0-1	An XML boolean indicating whether the result of the Criterion should be negated. The default value for this field is 'false'.
<Target>	Target	1	An XML string containing a Targeting Expression identifying the region of the record that is being targeted.
<Test>	Test	1	An XML element containing the Test. This element MUST consist only of the indicated XML fields.
@capability_id	Capability ID	1	An XML AnyURI indicating the Capability Module used in this Test.
@relationship	Relationship	1	An XML string containing the relationship.
<Parameter>	Parameter	0-n	An XML string containing the value of this parameter.

XML Name	Data Model Name	#	Description
@name	Name	1	An XML string containing the name of this parameter.

3.2 Query Information Structure

The following table details the query structure of the Default Query Information Structure. This structure is used within the Supported Query field of a Discovery Response.

Table 6 - Default Query Information Structure

Name	Required?	Multiple?	Description
Default Query Information	Yes	No	This field contains the query information. This field indicates which Targeting Expressions and Capability Modules are supported.
Targeting Expression Information	Yes	Yes	This field contains information related to the Targeting Expressions that are supported.
Targeting Expression ID	Yes	No	A Targeting Expression ID, Indicating a supported Targeting Expression Vocabulary.
Preferred Scope	At least one of MUST be present; both MAY be present.	Yes	This field contains a Targeting Expression that identifies a subset of valid Targeting Expressions. The query provider is able to provide a response more rapidly to requests that contain a query when Targeting Expressions in the Preferred Scope are used. For more information on Preferred Scope, see Section 3.2.1.1.
Allowed Scope		Yes	This field contains a Targeting Expression that identifies a subset of valid Targeting Expressions. The query provider is able to provide a response to requests that contain a query when Targeting Expressions in the Allowed Scope are used. For more information on Allowed Scope, see Section 3.2.1.1.
Capability Module	Yes	Yes	Contains a Capability Module ID, indicating a supported Capability Module. This may be a Capability Module defined by this specification or by a third party.

3.2.1.1 Preferred Scope and Allowed Scope

The Default Query Information structure contains two fields that indicate the permissible scope of queries: Preferred Scope and Allowed scope. This section discusses and defines the format of these fields.

Query providers that support a particular Targeting Expression Vocabulary (e.g., STIX™ 1.1) may want to support queries against only particular regions of that Targeting Expression Vocabulary (e.g., Indicators). For this reason, the TAXII Default Query provides a mechanism for query providers to define

the scope of supported Targeting Expressions (within the overall set of expressions allowed in the Targeting Expression structure). The scope of permissible Targeting Expressions is divided into two query-provider defined regions: Preferred Scope (quicker responses can be provided) and Allowed Scope (responses can be provided). Generally speaking, Targeting Expressions within a query provider's Preferred Scope can be serviced more rapidly than Targeting Expressions within a query provider's Allowed Scope.

The values of all Preferred Scope and Allowed Scope fields MUST be Targeting Expressions that are valid per the Targeting Expression ID field of the Default Query Information structure. Requests that contain queries MUST use Targeting Expressions that are within the scope described by either the Preferred Scope or Allowed Scope. Query providers that wish to indicate that all Targeting Expressions are in scope should use '**' in either the Preferred Scope (if the query provider can provide a rapid response to any query) or Allowed Scope field (if the query provider can provide a response to any query).

Figure 1 is a visual representation of how the Preferred and Allowed Scope are related to the set of all valid Targeting Expressions for a particular Targeting Expression Vocabulary. Both the Allowed Scope and Preferred Scope are subsets of all valid Targeting Expressions. If an expression is preferred, it is by definition allowed.

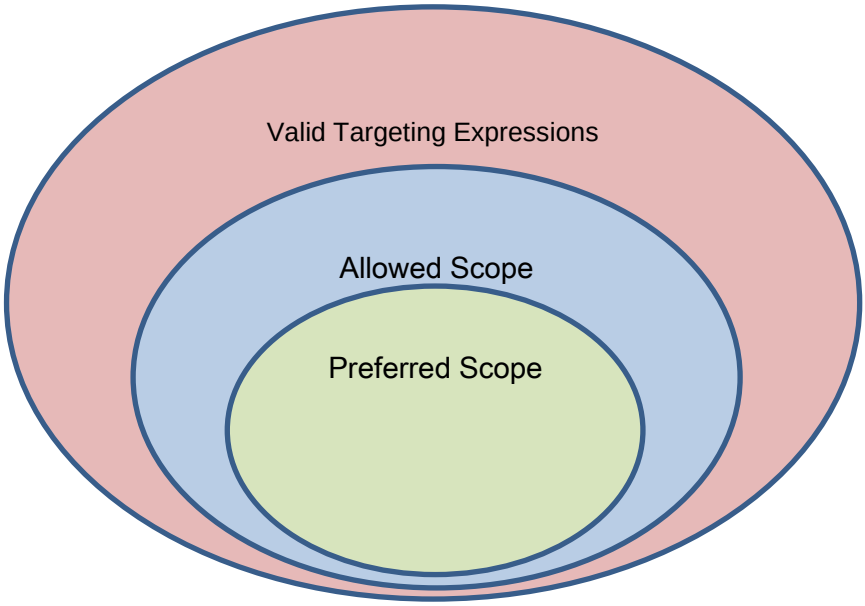

Figure 1- Venn Diagram of Targeting Expression Scope

Example values of these fields (and their meanings):

1. STIX_Package/Indicators/Indicator/** - Indicates that all fields in the STIX Indicator construct are in scope.
2. **/@id – Indicates that all STIX id fields are in scope.
3. STIX_Package/STIX_Header/Title – Indicates that the Title of a STIX document is in scope.
4. ** - Indicates that all fields are in scope.

3.2.2 XML Representation

This section defines the XML representation of the Query Information Structure. This structure is intended for use with the TAXII XML Message Binding 1.1.1 (urn:oasis:cti:taxii:xml:1.1.1).

The XML Namespace for this representation is: http://docs.oasis-open.org/cti/ns/taxii/default-query-1.1.1

XML Name	Data Model Name	Multiple?	Description

XML Name	Data Model Name	Multiple?	Description
<Default_Query_Info>	Default Query Information	1	The element name indicates that this is a query information structure. Its body consists only of the indicated fields.
<Targeting_Expression_Info>	Targeting Expression Information	1-n	The element name indicates that this is a Targeting Expression Information field. Its body consists only of the indicated XML Fields.
@targeting_expression_id	Targeting Expression ID	1	An XML AnyURI containing a Targeting Expression Vocabulary ID.
<Preferred_Scope>	Preferred Scope	1-n	An XML String containing a Targeting Expression.
<Allowed_Scope>	Allowed Scope		An XML String containing a Targeting Expression.
<Capability_Module>	Capability Module	1-n	An XML AnyURI indicating a Capability Module.

3.3 Query Evaluation

This section defines how queries are evaluated.

When a Query structure is present, the consumer is requesting only the records from a TAXII Data Collection that meet the specified criteria. If a Query is present and the producer is incapable or unwilling to process the Query, the producer should indicate this condition with a Status Message, nominally of "Query Not Supported".

Queries should be fulfilled in a manner that produces the same result as following these steps:

1. As an optional first step, inspect the Query structure for errors (e.g., a relationship that is not valid for a given Capability Module) and unsupported features (e.g., an unsupported Capability Module or Targeting Expression). If an error or unsupported feature is detected, respond with a Status Message that identifies the error condition.

2. For each record in the identified TAXII Data Collection (the Data Collection name is specified outside of the Query structure), evaluate the Criteria. If the Criteria evaluates to "true" the record should be included in the result set.

Criteria should be evaluated in a manner that produces the same result as following these steps:

1. Create a list of all Child Criteria (Note that Criteria can be a Child of Criteria. For the purposes of this workflow, they are distinguished as the Parent Criteria, which is the Criteria that is evaluated in this workflow, and the Child Criteria, which are immediate descendants of the Parent Criteria) and Child Criterion.
2. For each Child Criteria/Criterion:

a. If the Child is a Criteria, evaluate the Child Criteria to determine if it is True or False by following this workflow from Step #1.
   (Note: This is recursive. Eventually there will be a Criteria that has only Criterion children.)
b. If the Child is a Criterion, evaluate the Target against the Test, and apply negation if necessary to determine if the Child Criterion is True or False.
   Note: The authors recognize that this is a non-trivial "exercise left for the reader". However, evaluation of individual Criterion is implementation specific and therefore out of scope for this specification.
c. If the Child Criteria/Criterion evaluates to True and the Operator is OR, the Parent Criteria evaluates to True.
d. If the Child Criteria/Criterion evaluates to True and the Operator is AND, processing continues unless there are no more Child Criteria/Criterion. If there are no more Child Criteria/Criterion, the Parent Criteria evaluates to True.
e. If the Child Criteria/Criterion evaluates to False and the Operator is OR, processing continues unless there are no more Child Criteria/Criterion. If there are no more Child Criteria/Criterion, the Parent Criteria evaluates to False.
f. If the Child Criteria/Criterion evaluates to False and the Operator is AND, the Parent Criteria evaluates to False.

4 Targeting Expressions

A Targeting Expression is contained by the Target field of a Query Structure. Within a Criterion, the Target is used to identify a specific region of a record to which the Test should be applied. This section defines the Targeting Expression syntax used by all TAXII Default Queries. The Targeting Expression syntax, in conjunction with a Targeting Expression Vocabulary, are used to form a Targeting Expression. This section defines one Targeting Vocabulary that Query providers may choose to use. Third parties may define additional vocabularies for use with the Targeting Expression syntax defined by this section.

4.1 Targeting Expression Syntax

All Targeting Expressions use a syntax called Slash Notation. Using the Slash Notation Targeting Expression syntax, a Targeting Expression consists of one or more of Nodes (recall that one or more Nodes make up a Targeting Expression Vocabulary) separated by a forward slash (/). A Node can be one of four things:

1. Node – The name of a Node in the indicated Targeting Expression Vocabulary (This is indicated by the Targeting Expression ID property of a Query). Field Names are case sensitive unless the Targeting Expression Vocabulary defines them to be case insensitive.
2. Field Wildcard – This indicates any Node. Only a single Node is represented. This is indicated by a star (*).
3. Multi-field Wildcard – This indicates any Node or series of Nodes. This is indicated by two stars (**).

4.2 Targeting Expression Vocabularies

A Targeting Expression vocabulary defines which Nodes are permitted in a Targeting Expression, the Node hierarchy, and whether wildcards are permitted. Targeting Expression Vocabularies can range from a list of allowed Nodes to hierarchy of Nodes.

This document defines one Targeting Expression Vocabulary for STIX, which query providers may choose to use (or not). Third parties may define their own Targeting Expression Vocabularies.

4.2.1 STIX™ Targeting Expression Vocabulary

The Targeting Expression Vocabulary ID that identifies the STIX Targeting Expression Vocabulary is the Content Binding ID for STIX. Recall that the formula for a STIX Content Binding ID is:

"urn:oasis:cti:stix:" + *format* + ":" + *version*

The set of allowed Nodes within a Targeting Expression using this vocabulary are:

1. Any XML element defined by the version of STIX identified by the *version* portion of the Targeting Expression Vocabulary ID. These Nodes do not have any additional marking (e.g., the 'STIX_Package' element Node name is 'STIX_Package').
2. Any XML attribute defined by the version of STIX identified by the *version* portion of the Targeting Expression Vocabulary ID. These Nodes are prefixed by an at (@) symbol (e.g., the 'version' attribute Node name is '@version').

The Node ordering is defined by the version of STIX identified by the *version* portion of the Targeting Expression Vocabulary ID. Specifically, the Node hierarchy follows the following rules:

1. The STIX root element (e.g., STIX_Package) is the root Node and is at the top of the hierarchy.
2. Child elements and attributes of a STIX element are children of that Node

    a. e.g., ‘Indicators’, an XML element, and ‘version’, an XML attribute, are both child Nodes of the STIX_Package Node.
    b. The ‘Indicators’ Node name is ‘Indicators’
    c. The ‘version’ Node name is ‘@version’
3. The Field Wildcard (*) is permitted.
4. The Multi-field Wildcard (**) is permitted.

Examples:

1. STIX_Package/* - targets any element or attribute child of the STIX_Package XML Element
2. STIX_Package/Indicators/** - targets any element or attribute descendant of the Indicators XML Element.
3. **/@id - targets any attribute named ‘id’ within the STIX structure.

4.2.2 Third Party Targeting Expression Vocabularies

All Third Party Targeting Expression Vocabularies MUST define the following information:

1. The Targeting Expression Vocabulary ID, which MUST be in URI format.
2. The set of allowed Nodes
3. The hierarchy of allowed nodes
4. The meaning of the Field Wildcard (the Field Wildcard MAY be prohibited)
5. The meaning of the Multi-field Wildcard (the Multi-field Wildcard MAY be prohibited)
6. At least one example Targeting Expression. The example should include a statement as to which record region is targeted by that Targeting Expression.

4.2.3 Example Third Party Targeting Expression Vocabulary

This section provides an example that only permits a single field of “File_Hash”. A Third Party might define this vocabulary if they wish to provide a service that permits only queries that look for information on a particular file hash.

Targeting Expression Vocabulary ID: urn:example.com:vocab:filehash
Allowed Nodes: ‘File_Hash’
Node Hierarchy: There is no hierarchy, as there is only one level of Nodes
Field Wildcard: This is prohibited
Multi-field Wildcard: This is prohibited
Examples:

1. File_Hash - targets the file hash portion of the record.

5 Capability Modules

This section contains the Capability Modules defined by this document. Third parties may define additional capability modules for use with the TAXII Default Query.

This section defines thee capability modules:

- Core – A common set of relationships that are expected to be implementable across a wide range of systems.
- Regular Expression – Defines the ability to use a regular expression in a Default Query.
- Timestamps – Relationships that can be used to compare timestamps.

5.1 Capability Module: Core

This section defines the Core Capability Module. The Core Capability Module includes a set of relationships that can be expressed in a wide range of database systems.

The Capability Module ID that identifies this capability module is:

`urn:oasis:cti:taxii:query:capability:core-1`

5.1.1 Relationship: equals

The equals relationship returns true if the target matches the value exactly. If the target merely contains the value (but does not match exactly) the relationship returns false.

Table 7 - Parameters for Core Equals

Parameter Name	Permitted Values	Description
match_type	Only the following values are permitted: • case_sensitive_string • case_insensitive_string • number	case_sensitive_string indicates that a case sensitive string comparison should be performed. case_insensitive_string indicates that a case insensitive string comparison should be performed. number indicates that a numeric comparison should be performed. Other match types (e.g., Date/Time) are not permitted for this relationship.
value	Any string is permitted	The string that the target is compared against.

5.1.2 Relationship: not_equals

The not equals relationship returns true if the target does not match the value.

Table 8 - Parameters for Core Not Equals

Parameter Name	Permitted Values	Description

match_type	Only the following values are permitted: • case_sensitive_string • case_insensitive_string • number	case_sensitive_string indicates that a case sensitive string comparison should be performed. case_insensitive_string indicates that a case insensitive string comparison should be performed. number indicates that a numeric comparison should be performed. Other match types (e.g., Date/Time) are not permitted for this relationship.
value	Any string is permitted	The string that the target is compared against.

5.1.3 Relationship: greater_than

The greater than relationship returns true if the target is numerically greater than the value. This relationship is only valid for numeric comparisons (e.g., it is not valid for string comparisons).

Table 9 - Parameters for Core Greater Than

Parameter Name	Permitted Values	Description
value	Any number is permitted	The number that the target is compared against.

5.1.4 Relationship: greater_than_or_equal

The greater than or equal relationship returns true if the target is numerically greater than or equal to the value. This relationship is only valid for numeric comparisons (e.g., it is not valid for string comparisons).

Table 10 - Parameters for Core Greater Than or Equals

Parameter Name	Permitted Values	Description
value	Any number is permitted	The number that the target is compared against.

5.1.5 Relationship: less_than

The less than relationship returns true if the target is numerically less than the value. This relationship is only valid for numeric comparisons (e.g., it is not valid for string comparisons).

Table 11 - Parameters for Core Less Than

Parameter Name	Permitted Values	Description
value	Any number is permitted	The number that the target is compared against.

5.1.6 Relationship: less_than_or_equal

The less than or equal relationship returns true if the target is numerically less than or equal to the value. This relationship is only valid for numeric comparisons (e.g., it is not valid for string comparisons).

Table 12 - Parameters for Core Less Than or Equal

Parameter Name	Permitted Values	Description
value	Any number is permitted	The number that the target is compared against.

5.1.7 Relationship: does_not_exist

The greater than relationship returns true if the target does not exist.

Table 13 - Parameters for Core Does Not Exist

Parameter Name	Permitted Values	Description
There are not any parameters for this relationship.		

5.1.8 Relationship: exists

The contains relationship returns true if the target exists.

Table 14 - Parameters for Core Exists

Parameter Name	Permitted Values	Description
There are not any parameters for this relationship.		

5.1.9 Relationship: begins_with

The begins with relationship returns true if the target begins with the value. This relationship is only valid for string comparisons.

Table 15 - Parameters for Core Begins With

Parameter Name	Permitted Values	Description
case_sensitive	Only the following values are permitted: • true • false	If true, a case sensitive comparison should be performed. If false, a case insensitive comparison should be performed. If this field is absent, this parameter should be treated as “true”.
value	Any string is permitted	The string that the target is compared against.

5.1.10 Relationship: ends_with

The ends with relationship returns true if the target ends with the value. This relationship is only valid for string comparisons.

Table 16 - Parameters for Core Ends With

Parameter Name	Permitted Values	Description
case_sensitive	Only the following values are permitted: • true • false	If true, a case sensitive comparison should be performed. If false, a case insensitive comparison should be performed. If this field is absent, this parameter should be treated as “true”.

value	Any string is permitted	The string that the target is compared against.

5.1.11 Relationship: contains

The contains relationship returns true if the target contains the value. This relationship is only valid for string comparisons.

Table 17 - Parameters for Core Contains

Parameter Name	Permitted Values	Description
case_sensitive	Only the following values are permitted: • true • false	If true, a case sensitive comparison should be performed. If false, a case insensitive comparison should be performed. If this field is absent, this parameter should be treated as "true".
value	Any string is permitted	The string that the target is compared against.

5.2 Capability Module: Regular Expression

This section defines the Regular Expression Capability Module. The Regular Expression Capability Module includes a single relationship that is used to perform Regular Expression Matching.

The Capability Module ID that identifies this capability module is:

```
urn:oasis:cti:taxii:query:capability:regex-1
```

5.2.1 Relationship: matches

The matches relationship returns true if the target matches the regular expression contained in the value.

Table 18 - Parameters for Regex Matches

Parameter Name	Permitted Values	Description
case_sensitive	Only the following values are permitted: • true • false	true indicates that the regular expression should be matched in a case sensitive manner. False indicates that the regular expression should be matched in a case insensitive manner.
value	Regular expressions that conform to the CybOX™ common subset of regular expression syntax.	The regular expression that the target is compared against. The regular expressions in this field must conform to the regular expression syntax used by CybOX: http://cybox.mitre.org/language/regular_expression_support.pdf.

5.3 Capability Module – Timestamp

The Capability Module ID that identifies this capability module is:

urn:oasis:cti:taxii:query:capability:timestamp-1

This capability module includes relationships that operate on timestamps.

5.3.1 Relationship: equals

The equals relationship returns true if the target and the value indicate the same time and date. This relationship is only valid for timestamp comparisons.

Table 19 - Parameters for Timestamp Equals

Parameter Name	Permitted Values	Description
value	Any RFC 3339 conformant timestamp is permitted	The timestamp that the target is compared against.

5.3.2 Relationship: greater_than

The greater than relationship returns true if the target occurs after the value. This relationship is only valid for timestamp comparisons.

Table 20 - Parameters for Timestamp Greater Than

Parameter Name	Permitted Values	Description
value	Any RFC 3339 conformant timestamp is permitted	The timestamp that the target is compared against.

5.3.3 Relationship: greater_than_or_equals

The greater than or equals relationship returns true if the target occurs after the value or the target and value indicate the same time and date. This relationship is only valid for timestamp comparisons.

Table 21 - Parameters for Timestamp Greater Than or Equals

Parameter Name	Permitted Values	Description
value	Any RFC 3339 conformant timestamp is permitted	The timestamp that the target is compared against.

5.3.4 Relationship: less_than

The less than relationship returns true if the target occurs before the value. This relationship is only valid for timestamp comparisons.

Table 22 - Parameters for Timestamp Less Than

Parameter Name	Permitted Values	Description
value	Any RFC 3339 conformant timestamp is permitted	The timestamp that the target is compared against.

5.3.5 Relationship: less_than_or_equals

The less than or equals relationship returns true if the target occurs before the value or the target and value indicate the same time and date. This relationship is only valid for timestamp comparisons.

Table 23 - Parameters for Timestamp Less Than or Equals

Parameter Name	Permitted Values	Description
value	Any RFC 3339 conformant timestamp is permitted	The timestamp that the target is compared against.

6 Examples

6.1 Query Information Structure Example

```
<!-- An example of a Supported_Query field -->
<taxii:Supported_Query
   xmlns:taxii="http://docs.oasis-open.org/cti/ns/taxii/xml/binding-1.1.1"
   format_id="urn:oasis:cti:taxii:query:1.1.1">
   <!-- The format_id indicates that this is a TAXII Default Query -->
   <tdq:Default_Query_Info
      xmlns:tdq="http://docs.oasis-open.org/cti/ns/taxii/default-query-1.1.1">
      <!-- This Targeting_Expression_Info element indicates the following:
         - STIX 1.1 is supported
         - The Indicators portion of STIX is the preferred scope
         - All of STIX is in the allowed scope
      -->
      <tdq:Targeting_Expression_Info
         targeting_expression_id="urn:oasis:cti:stix:xml:1.2.1">
         <tdq:Preferred_Scope>STIX_Package/Indicators/**</tdq:Preferred_Scope>
         <tdq:Allowed_Scope>**</tdq:Allowed_Scope>
      </tdq:Targeting_Expression_Info>
      <!-- The Capability_Module element indicates that:
         - The Core capability module is supported
         - The Regex capability module is supported
      -->
      <tdq:Capability_Module>urn:oasis:cti:taxii:query:capability:core-1</tdq:Capability_Module>
      <tdq:Capability_Module>urn:oasis:cti:taxii:query:capability:regex-1</tdq:Capability_Module>
   </tdq:Default_Query_Info>
</taxii:Supported_Query>
```

6.2 Query Structure Example - 1

```
<!-- An example of a Query field. The format_id indicates that this is a TAXII Default Query. -->
<taxii:Query
   xmlns:taxii="http://docs.oasis-open.org/cti/ns/taxii/xml/binding-1.1.1"
   format_id="urn:oasis:cti:taxii:query:1.1.1">
   <!-- This query tests for id attributes that begin with 'EXAMPLE' (case insensitive) -->
   <tdq:Default_Query
      xmlns:tdq="http://docs.oasis-open.org/cti/ns/taxii/default-query-1.1.1"
      targeting_expression_id="urn:oasis:cti:stix:xml:1.2.1">
      <tdq:Criteria operator="OR"><!-- Any child Criteria/Criterion evaluates to true -->
         <tdq:Criterion negate="false"><!-- This criterion is not negated -->
            <tdq:Target>**/@id</tdq:Target><!-- Matches any ID attribute, anywhere -->
            <!-- This test looks uses the 'begins with' relationship in the
                 core capability module, looking for values that begin with 'EXAMPLE'
                 (Case insensitie).
            -->
            <tdq:Test
               capability_id="urn:oasis:cti:taxii:query:capability:core-1"
               relationship="begins_with">
               <tdq:Parameter name="case_sensitive">false</tdq:Parameter>
               <tdq:Parameter name="value">EXAMPLE</tdq:Parameter>
            </tdq:Test>
         </tdq:Criterion>
```

```
      </tdq:Criteria>
   </tdq:Default_Query>
</taxii:Query>
```

6.3 Query Structure Example – 2

```
<!-- An example of a Query field. The format_id indicates that this is a TAXII Default Query. -->
<taxii:Query
   xmlns:taxii="http://docs.oasis-open.org/cti/ns/taxii/xml/binding-1.1.1"
   format_id="urn:oasis:cti:taxii:query:1.1.1">
   <!-- This query tests for id attributes that begin with 'example' (case sensitive) and
        have a description that contains 'The quick brown fox jumped over the very
        lazy dogs.' (case insensitive).
   -->
   <tdq:Default_Query
      xmlns:tdq="http://docs.oasis-open.org/cti/ns/taxii/default-query-1.1.1"
      targeting_expression_id="urn:oasis:cti:stix:xml:1.2.1">
      <tdq:Criteria operator="AND"><!-- All Child Criteria/Criterion evaluate to true -->
         <tdq:Criterion negate="false"><!-- Criterion is not negated -->
            <tdq:Target>**/@id</tdq:Target><!-- Matches any ID attribute, anywhere -->
            <!-- This test looks for any value that begins with example, and is case sensitive -->
            <tdq:Test capability_id="urn:oasis:cti:taxii:query:capability:core-1" relationship="begins_with">
               <tdq:Parameter name="case_sensitive">true</tdq:Parameter>
               <tdq:Parameter name="value">example</tdq:Parameter>
            </tdq:Test>
         </tdq:Criterion>
         <tdq:Criterion negate="false"><!-- Criterion is not negated -->
            <tdq:Target>**/Description</tdq:Target><!-- Matches any Description, anywhere -->
            <!-- This test looks for any value that contains the value, case insensisive -->
            <tdq:Test capability_id="urn:oasis:cti:taxii:query:capability:core-1" relationship="contains">
               <tdq:Parameter name="case_sensitive">false</tdq:Parameter>
               <tdq:Parameter name="value">The quick brown fox jumped over the very lazy dogs.</tdq:Parameter>
            </tdq:Test>
         </tdq:Criterion>
      </tdq:Criteria>
   </tdq:Default_Query>
</taxii:Query>
```

7 Conformance

Implementations have discretion over which parts of TAXII they implement (e.g., Discovery Service).

Conformant implementations must conform to all Normative Statements that apply to the portions of TAXII they implement (e.g., Implementers of the Discovery Service must conform to all Normative Statements regarding the Discovery Service).

Conformant implementations are free to ignore Normative Statements that do not apply to the portions of TAXII they implement (e.g., Non-implementers of the Discovery Service are free to ignore all Normative Statements regarding the Discovery Service).

The conformance section of this document is intentionally broad and attempts to reiterate what already exists in this document. The TAXII 1.1 Specifications, which this specification is based on, did not have a conformance section. Instead, the TAXII 1.1 Specifications relied on normative text. TAXII 1.1.1 represents a minimal change from TAXII 1.1, and in that spirit no new requirements have been defined in this document.

Appendix A. Acknowledgments

The individuals listed in this specification have participated in the creation of this specification and are gratefully acknowledged.

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Appendix B. Revision History

Revision	Date	Editor	Changes Made
Working Draft 01	01 July 2016	Bret Jordan	Initial working draft based on MITRE specification