

FDSN Web Service Specifications

Version 1.0

To specify web service interfaces for the exchange of time series data, related metadata, event parameter and other data within the context of the International Federation of Digital Seismograph Networks (FDSN). The intention is to provide a specification that, when implemented at different FDSN data centers, can be used interchangeably by the same client software. The specification defines service names, query parameters and expected results.

returns raw time series data in FDSN miniSEED format
returns metadata in FDSN StationXML and alternate formats
returns parametric data for events in QuakeML and alternate formats

The services are versioned according to the following three-digit x.y.z pattern:

SpecMajor.SpecMinor.Implementation

Where the fields have the following meaning:

SpecMajor: The major specification version, all implementations sharing this *SpecMajor* value will be backwards compatible with all prior releases. Values start at 1.

SpecMinor: The minor specification version, incremented when optional parameters or behavior is added to the previous specification but backwards compatibility is maintained with the previous major versions, i.e. all 1.x service versions will be compatible with version 1.0. Values start at 0.

Implementation: The implementation version, an integer identifier specific to the data center implementation. Useful to track service updates for bug fixes, etc. but with no implication on conformance to the specification.

Together the *SpecMajor* and *SpecMinor* versions imply a minimum expected behavior of a given service. This versioning scheme allows clients to expect specific behavior based on the *SpecMajor* version, while allowing the FDSN to extend the services with optional parameters while maintaining backwards compatibility. Each version number is service specific, there is no implication that *SpecMajor* version numbers across services are related.

The services will be invoked using a subset of REST and HTTP methods. In particular all services will be invoked using the HTTP GET method whenever possible and the HTTP POST method for the few cases where the selection parameters are potentially large in size.

The following base URI pattern is to be used at each data center implementing FDSN services:

site

where is one of *dataselect*, *station* or *event* and *SpecMajor* is an integer value specifying the major specification version supported by the service. A is the domain name of the data center hosting FDSN web services. For example the base URI for version of the FDSN station service at ORFEUS might be:

www.orfeus-eu.org fdsnws station

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All services should support these common methods:

to submit a data or information request

to request the full service version *SpecMajor.SpecMinor.Implementation*)

to request a WADL for the interface

Details of each method and further methods specific to a service are documented in the relevant service descriptions.

For example, submitting queries to the station service at ORFEUS would be performed using this URI:

http: www.orfeus-eu.org fdsnws station query? key value parameters

Similarly requesting the implementation version of the same service would be done using this URI:

http: www.orfeus-eu.org fdsnws station version

which returns as simple text string indicating the software version, e.g. . . .

Requesting the WADL for a the same interface:

http: www.orfeus-eu.org fdsnws station application.wadl

Implementations of these service interfaces should support all methods specified as required. Additionally, interfaces should conform to the calling patterns and expected results identified in this document to be considered conformant with the specification. Authentication methods are an exception, and only need to be supported by data centers that wish to require authentication for access to specific data sets.

Each service definition includes required and optional parameters; an implementation must support the required parameters to be considered conformant. The optional parameters supported by any given implementation should be specified in the WADL returned by the service.

Request URIs to FDSN web services must not exceed bytes in length including the URL encoding; most common requests will be much shorter. Requests should be URL Encoded as a standard practice before submission to the service, but services should handle non-encoded submissions as far as is possible.

General responses that should be used by all services are outlined below. Responses specific to each service are detailed in later sections.

If a properly formatted request is submitted but would result in no data being returned to the user the service should return No Content by default. Alternatively, the optional *nodata* parameter can be used to request that Not Found be returned instead. A status helps clarify situations where a may be confusing, such as a web browser user, by including a message in the response. Clients should be aware that the status code may be returned for error conditions such as problems with the web application or application container. Due to the multiple meanings for a status, the status is preferred for programmatic non-browser access.

Limitations on the amount of information returned for any given request may be imposed independently for each service by each data center. If a client submits a request that would result in a data set beyond the service limit the service should return an Request Entity Too Large . A should also be returned when the request itself is too large, the standard meaning of the status. In most cases, differentiating between these two cases will be obvious.

All errors reported to the client, either HTTP xx or xx status codes, should include an error message transmitted as MIME type using the following pattern:

Error <CODE>: <SIMPLE ERROR DESCRIPTION>

<MORE DETAILED ERROR DESCRIPTION>

Usage details are available from <SERVICE DOCUMENTATION URI>

Request:
<SUBMITTED URL>

Request Submitted:
<UTC DATE TIME>

Service version:
<3-LEVEL VERSION>

A

The WADL documents returned by FDSN services should follow these guidelines:

- All public parameters supported by an interface shall be documented in the WADL.
- Parameters supported by the interface shall be documented using the long version of the parameter name and not the abbreviated version.
- Parameters not included in the specification data center-specific extensions shall be documented with a type and a short description.

Table includes a list of common status codes returned by FDSN web services. In most cases these will be the only codes returned by the services. Under error, maintenance or otherwise unusual conditions a client may receive other HTTP codes generated by web service containers, layer routers e.g. load balancers , firewalls, etc.

Table 1. Common HTTP status codes returned by FDSN services

Code	Description
200	Successful request, results follow
204	Request was properly formatted and submitted but no data matches the selection
400	Bad request due to improper specification, unrecognized parameter, parameter value out of range, etc.
401	Unauthorized, authentication required
403	Authentication failed or access blocked to restricted data
404	Alternate to 204 (set via the 'nodata' parameter), normally used for results returned to a web browser.
413	Request would result in too much data being returned or the request itself is too large, returned error message should include the service limitations in the detailed description. Service limits should also be documented in the service WADL.
414	Request URI too large
500	Internal server error
503	Service temporarily unavailable, used in maintenance and error conditions

The common and specific request parameters for each service are summarized in Table . In this Table, the names are acceptable synonyms for the given name. For a specific service and parameter group, each sub-group parameter set is exclusive; for example, for a call to the service the client should supply a simple-time or window-time definition but not both. Service specific meanings for the parameters are described later in this document.

Table 2. Parameter specifications for FDSN web services. Appropriate services for each parameter group are identified in *italics*.

Group	Subgroup	Parameter	Abbreviation	Default	Minimum	Maximum	Type	Units	
time constraints									
	simple-time	fdsnws-datasetselect, fdsnws-station, fdsnws-event							
		starttime	start	[Any]			time	UTC	
		endtime	end	[Any]			time	UTC	
	window-time	fdsnws-station							
		startbefore		[Any]			time	UTC	
		startafter		[Any]			time	UTC	
		endbefore		[Any]			time	UTC	
	endafter		[Any]			time	UTC		
channel constraints									
	fdsnws-datasetselect, fdsnws-station								
	network	net	[Any]				string	[Not Applicable]	
	station	sta	[Any]				string	[Not Applicable]	
	location	loc	[Any]				string	[Not Applicable]	
	channel	cha	[Any]				string	[Not Applicable]	
geographic constraints									
	area-rectangle	fdsnws-station, fdsnws-event							
		minlatitude	minlat	-90.0	-90.0	90.0	float	degrees	
		maxlatitude	maxlat	90.0	-90.0	90.0	float	degrees	
		minlongitude	minlon	-180.0	-180.0	180.0	float	degrees	
		maxlongitude	maxlon	180.0	-180.0	180.0	float	degrees	
	area-circle	fdsnws-station, fdsnws-event							
		latitude	lat	0.0	-90.0	90.0	float	degrees	
		longitude	lon	0.0	-180.0	180.0	float	degrees	
		minradius		0.0	0.0	180.0	float	degrees	
	maxradius		180.0	0.0	180.0	float	degrees		
output control									
	fdsnws-datasetselect, fdsnws-station, fdsnws-event								
	format		xml or miniseed				string	[Not Applicable]	
	nodata		204				string	[Not Applicable]	
service-specific constraints									
	fdsnws-station	fdsnws-station							
		level		station				string	[Not Applicable]
		includerestricted		TRUE				boolean	[Not Applicable]
		includeavailability		FALSE				boolean	[Not Applicable]
		updatedafter		[ANY]				time	UTC
		matchtimeseries		FALSE				boolean	[Not Applicable]
	fdsnws-event	fdsnws-event							
		mindepth		[Any]	[Any]	[Any]		float	kilometers
		maxdepth		[Any]	[Any]	[Any]		float	kilometers
		minmagnitude	minmag	[Any]	[Any]	[Any]		float	
		maxmagnitude	maxmag	[Any]	[Any]	[Any]		float	
		magnitudetype	magtype	[Any]				string	[Not Applicable]
		includeallorigins		FALSE				boolean	[Not Applicable]
		includeallmagnitudes		FALSE				boolean	[Not Applicable]
		includearrivals		FALSE				boolean	[Not Applicable]
eventid			[Any]				string	[Not Applicable]	
limit		[Any]	1	[Any Positive]		integer	[Not Applicable]		
offset		1	1	[Any Positive]		integer	[Not Applicable]		
	orderby		time				integer	[Not Applicable]	

The channel constraint parameters `network`, `station`, `location` and `channel` may include two specific wildcard characters with the following meaning:

Matches zero to many characters

Matches any single character

The channel constraint parameters may also be submitted as comma-separated lists in order to select two or more values with a single request. For example, the `channel` parameter may be used to specify multiple channels:

`channel LHE,LHN,LHZ,BHZ`

the individual values may also include wildcards

All values are specified in UTC and should use one particular variation of the ISO standard with the addition of sub-seconds:

`T`

Where the fields are as specified in ISO and a `T` separates the date and time. The are the sub-seconds expressed between of a second to microsecond resolution; they do not all need to be present.

Two shorter variations for specifying time should be supported:

`T`

implies a time of

`T : : .`

where the sub-seconds are interpreted to be zeros and

implies a time of

`T : : .`

where the hour, minute, second and sub-second are interpreted to be zeros.

The *starttime* parameter should be interpreted as selecting any data or information time series samples, earthquake origins, metadata epochs at times on or later than the value specified. Similarly, the *endtime* selects any data or information at times on or prior to the value specified. The selection shall include any metadata epochs intersecting with the specified time range.

The *startbefore*, *startafter*, *endbefore* and *endafter* parameters, used only for the service, specify the selection of information strictly starting or ending before or after a specified time value; they do not match any information occurring exactly at the time specified. These selection parameters are specifically for metadata and are useful for matching information that would otherwise be difficult with the other time parameters.

String type parameters may include ASCII characters, including the asterisk and question mark that have special meaning as wildcards for specific parameters.

Float type parameters should be specified in decimal notation, for example . . . Scientific notation using an exponent or other representations will not accepted and should generate errors.

Boolean type parameters should be specified as either TRUE or FALSE, case insensitive.

Integer type parameters should be specified in decimal notation without a decimal point, exponential or other notation.

Blank or empty location identifiers are encoded in SEED as two space characters ASCII decimal 32. These may be specified by setting the *location* parameter to a string of two spaces, but care must be taken to properly encode the URI. For clarity and convenience, blank SEED location identifiers may also be specified by setting the *location* parameter to -- two dashes which the service should translate to two space characters as needed.

The following methods shall be supported by the service:

- to submit a data request
- to authenticate and submit a data request
- to request the full service version number
- to request a WADL for the interface

Requests using the *query* method:

The service shall accept requests formulated using the selection parameters identified in Table 3: *simple-time, channel constraints* and parameters specific to *seed*. Table 3 contains parameter descriptions for this service.

Table 3. Parameter descriptions for the **fdsnws-dataselect** service.

Parameter	Support	Description
starttime	Required	Limit results to time series samples on or after the specified start time
endtime	Required	Limit results to time series samples on or before the specified end time
network	Required	Select one or more network codes. Can be SEED network codes or data center defined codes. Multiple codes are comma-separated.
station	Required	Select one or more SEED station codes. Multiple codes are comma-separated.
location	Required	Select one or more SEED location identifiers. Multiple identifiers are comma-separated. As a special case "--" is translated to a string of two space characters to match the SEED convention.
channel	Required	Select one or more SEED channel codes. Multiple codes are comma-separated.
quality	Optional	Select a specific quality level. Center dependent.
minimumlength	Optional	Limit results to a minimum length specified in seconds, minutes, or hours.
longestonly	Optional	Limit results to the longest available sample.
format	Optional	Specify the output format.

All rules for parameters apply equally whether specified using the GET or POST methods with the exception of blank location IDs, which must be specified as -- in the POST body due to spaces being used as the field separator.

Responses for the *query* method:

The results of a successful request shall be returned as a stream of miniSEED by default, using the MIME type . The exact nature of the miniSEED returned by this service is data center dependent, a center may choose to remove duplicated data or prune to the exact window specified by the caller. The time series is generally expected to represent unprocessed, raw recorded data as supplied by the network operator or data owner. A data center may choose to return the results in alternate formats as specified by the format parameter.

Behavior for the *queryauth* method

HTTP Digest Authentication RFC should be requested from the client. After successful authentication, a request should be accepted and handled as per the *query* method. Authentication credentials user database and associated licensing schemes are data center specific.

Behavior for the *version* method

The service shall return the implementation version as a simple text string using the MIME type . Any parameters submitted with the method will be ignored.

Behavior for the *application.wadl* method

The service shall return a WADL conformant description of the interface using the MIME type . Any parameters submitted with the method will be ignored. The WADL shall describe all parameters supported by the interface and is primarily used to document which optional parameters are supported.

Behavior for the conditions

All errors returned to the client shall use the type and pattern described in the Common Service Responses section.

Requesting all data channels from IU station COLA for the first hours of year using a GET request:

<http://service.iris.edu/fdsnws/dataselect/1/query?network=IU&station=COLA&starttime=2012-01-01T00:00:00&endtime=2012-01-01T12:00:00>

Requesting all LHE, LHN, LHZ data channels from IU station COLA for the first hours of year using a POST request:

<http://service.iris.edu/fdsnws/dataselect/1/query>

POST message body:

```
quality=M
IU COLA 00 LHE 2012-01-01T00:00:00 2012-01-01T12:00:00
IU COLA 00 LHN 2012-01-01T00:00:00 2012-01-01T12:00:00
IU COLA 00 LHZ 2012-01-01T00:00:00 2012-01-01T12:00:00
```

The following methods shall be supported by the service:

- to submit a data request
- to request the full service version number
- to request a WADL for the interface

Requests using the *query* method:

The service shall accept requests formulated using the selection parameters identified in Table : *time constraints, channel constraints, geographic constraints* and the parameters listed that are specific for . Table contains parameter descriptions for this service.

Table 4. Parameter descriptions for the **fdsnws-station** service.

Parameter	Support	Description
starttime	Required	Limit to metadata epochs starting on or after the specified start time.
endtime	Required	Limit to metadata epochs ending on or before the specified end time.
startbefore	Optional	Limit to metadata epochs starting before specified time.
startafter	Optional	Limit to metadata epochs starting after specified time.
endbefore	Optional	Limit to metadata epochs ending before specified time.
endafter	Optional	Limit to metadata epochs ending after specified time.
network	Required	Select one or more network codes. Can be SEED network codes or data center defined codes. Multiple codes are comma-separated.
station	Required	Select one or more SEED station codes. Multiple codes are comma-separated.
location	Required	Select one or more SEED location identifiers. Multiple identifiers are comma-separated. As a special case "--" (two dashes) will be translated to a string of two space characters to match blank location IDs.
channel	Required	Select one or more SEED channel codes. Multiple codes are comma-separated.
minlatitude	Required	Limit to stations with a latitude larger than or equal to the specified minimum.
maxlatitude	Required	Limit to stations with a latitude smaller than or equal to the specified maximum.
minlongitude	Required	Limit to stations with a longitude larger than or equal to the specified minimum.
maxlongitude	Required	Limit to stations with a longitude smaller than or equal to the specified maximum.
latitude	Optional	Specify the latitude to be used for a radius search.
longitude	Optional	Specify the longitude to be used for a radius search.
minradius	Optional	Limit results to stations within the specified minimum number of degrees from the geographic point defined by the latitude and longitude parameters.
maxradius	Optional	Limit results to stations within the specified maximum number of degrees from the geographic point defined by the latitude and longitude parameters.
level	Required	Specify the level of detail for the results.
includerestricted	Optional	Specify if results should include information for restricted stations.
includeavailability	Optional	Specify if results should include information about time series data availability.
updatedafter	Optional *	Limit to metadata updated after specified time; updates are data center specific. * While this option is not required it is highly recommended due to usefulness.
matchtimeseries	Optional	Limit to metadata where selection criteria matches time series data availability.
format	Optional	Specify format of result, either 'xml' (default) or 'text' (defined below). If this parameter is not specified the service must return StationXML.
nodata	Optional	Select status code for "no data", either '204' (default) or '404'.

These parameters may be submitted using either of the HTTP GET or POST methods. The POST method is useful to allow a large number of core request parameters to be submitted.

For the GET method, the parameters should be submitted as key value pairs and may not be specified more than once; if a parameter is submitted multiple times the result is undefined.

For the POST method, all parameters must be submitted as part of the POST body. The parameters for *network*, *station*, *location*, *channel*, *starttime* and *endtime* may be repeated as many times as necessary, all other parameters should be specified as key value pairs on separate lines following this pattern:

```
parameter1=value
parameter2=value
NET STA LOC CHA STARTTIME ENDTIME
NET STA LOC CHA STARTTIME ENDTIME
NET STA LOC CHA STARTTIME ENDTIME
```

This would be POSTed to the URI `site fdsnws station query` .

All rules for parameters apply equally whether specified using the GET or POST methods with the exception of blank location IDs, which must be specified as `--` in the POST body due to spaces being used as the field separator.

Controlling the level of detail

The *level* parameter controls the amount of detail included in the returned FDSN StationXML results with the following hierarchy: network, station, channel and response. For example, if the station level is requested the Station elements will be included in the results but not Channel or Response related information.

Responses for the **query** method:

The results of a successful request shall be returned as FDSN StationXML using MIME type `application/xml` by default or when the *format* parameter value is 'xml' . If the *format* parameter value is 'text' the results shall be returned in a simple ASCII format for *level* network, station or channel using MIME type `text/plain` as defined below. Requests for text output at the response level should generate an error.

Behavior for the **version** method

The service shall return the implementation version as a simple text string using the MIME type `text/plain` . Any parameters submitted with the method will be ignored.

Behavior for the **application.wadl** method

The service shall return a WADL conformant description of the interface using the MIME type `application/wadl+xml` . Any parameters submitted with the method will be ignored. The WADL shall describe all parameters supported by the interface and is primarily used to document which optional parameters are supported.

Behavior for the **conditions**

All errors returned to the client shall use the type and pattern described in the Common Service Responses section.

Behavior for the *matchtimeseries* parameter

When *matchtimeseries* is TRUE: in addition to matching metadata based on selection criteria, the results will be further limited to metadata for which the selection criteria e.g. *starttime*, *endtime*, *network*, *station*, *location*, *channel* also match the existence of available time series data.

Text output formats for network, station and channel levels

These simple text output formats contain one entry per line with common fields separated by vertical bar characters : ASCII decimal . Field entries cannot contain vertical bar characters. Lines beginning with a hash character : ASCII decimal should be considered comment lines.

level=network

Network	Description	StartTime	EndTime	TotalStations
Network	Description	StartTime	EndTime	TotalStations

...

level=station

Network	Station	Latitude	Longitude	Elevation	StartTime	EndTime
Network	Station	Latitude	Longitude	Elevation	StartTime	EndTime

...

level=channel

Network	Station	Location	Channel	Latitude	Longitude	Elevation	Depth	Azimuth	Dip	SensorDescription	Scale	ScaleFrequency	ScaleUnits	SampleRate	StartTime	EndTime
Network	Station	Location	Channel	Latitude	Longitude	Elevation	Depth	Azimuth	Dip	SensorDescription	Scale	ScaleFrequency	ScaleUnits	SampleRate	StartTime	EndTime

...

The description for each column is, in most cases, directly equivalent to the like named element or attribute in StationXML and SEED, column values should follow the conventions used in those formats.

In these text formats the meaning of the StartTime and EndTime values change depending on the level of the output. For channel-level output the time values refer to channel operating times, for station-level output the time values refer to station operating times and for network-level output the time values refer to network operating times. Similarly, the meaning of the Latitude and Longitude values change depending on the level, they are either station coordinates or channel coordinates.

In the network level output, the TotalStations value is the number of stations associated with the given network entry.

In the channel level output, the Scale value is the total sensitivity, the ScaleFrequency is the frequency at which the Scale is valid and the ScaleUnits are the units of data after the Scale value has been applied. These values are equivalent to the values in the StationXML

InstrumentSensitivity structure or stage of SEED headers.

In the channel level output, the SensorDescription field is equivalent to the StationXML element Network::Station::Channel::Sensor::Type, which is commonly mapped to description identified in field of SEED Blockette .

Requesting metadata for all channels from IU station COLA with no time limitations:

<http://service.iris.edu/fdsnws/station/1/query?network=IU&station=COLA&level=channel>

Requesting metadata for all BH channels between latitude - and - and longitude between and e.g. Australia :

http://service.iris.edu/fdsnws/station/1/query?channel=BH*&maxlatitude=-10&minlatitude=-45&minlongitude=122&maxlongitude=155&level=channel

Requesting metadata in simple text format at the network level:

<http://service.iris.edu/fdsnws/station/1/query?network=II,IU&format=text&level=network>

#Network	Description	StartTime	EndTime	TotalStations
II	Global Seismograph Network (GSN - IRIS/IDA)	1986-01-01T00:00:00	2500-12-12T23:59:59	50
IU	Global Seismograph Network (GSN - IRIS/USGS)	1988-01-01T00:00:00	2500-12-12T23:59:59	255

Requesting metadata in simple text format at the station level:

<http://service.iris.edu/fdsnws/station/1/query?network=IU&format=text&level=station>

#Network	Station	Latitude	Longitude	Elevation	SiteName	StartTime	EndTime
IU	ANMO	34.9459	-106.4572	1850.0	Albuquerque, New Mexico, USA	1989-08-29T00:00:00	1995-07-14T00:00:00
IU	ANMO	34.9459	-106.4572	1850.0	Albuquerque, New Mexico, USA	1995-07-14T00:00:00	2000-10-19T16:00:00
IU	ANMO	34.9502	-106.4602	1839.0	Albuquerque, New Mexico, USA	2000-10-19T16:00:00	2002-11-19T21:07:00
...							

Requesting metadata in simple text format at the channel level:

<http://service.iris.edu/fdsnws/station/1/query?station=COLA&format=text&level=channel>

#Network	Station	Location	Channel	Latitude	Longitude	Elevation	Depth	Azimuth	Dip	SensorDescription	Scale	ScaleFreq	ScaleUnits	SampleRate	StartTime	EndTime
IU	COLA	20	HNE	64.873599	-147.8616	200.0	0.0	90.0	0.0	Kinematics FBA-23 Low-Gain	53687.1	1.0	M/S**2	80.0	2005-09-28T22:00:00	2009-07-08T22:00:00
IU	COLA	20	HNN	64.873599	-147.8616	200.0	0.0	0.0	0.0	Kinematics FBA-23 Low-Gain	53687.1	1.0	M/S**2	80.0	2005-09-28T22:00:00	2009-07-08T22:00:00
IU	COLA	20	HNZ	64.873599	-147.8616	200.0	0.0	0.0	-90.0	Kinematics FBA-23 Low-Gain	53687.1	1.0	M/S**2	80.0	2005-09-28T22:00:00	2009-07-08T22:00:00
IU	COLA	00	BH1	64.873599	-147.8616	80.0	120.0	111.0	0.0	Geotech KS-54000 Borehole Seismometer	8.04479E8	0.02	M/S	20.0	2005-09-27T00:00:00	2009-07-08T22:00:00
IU	COLA	00	BH2	64.873599	-147.8616	80.0	120.0	201.0	0.0	Geotech KS-54000 Borehole Seismometer	8.1814E8	0.02	M/S	20.0	2005-09-27T00:00:00	2009-07-08T22:00:00
IU	COLA	00	BHZ	64.873599	-147.8616	80.0	120.0	0.0	-90.0	Geotech KS-54000 Borehole Seismometer	8.44329E8	0.02	M/S	20.0	2005-09-27T00:00:00	2009-07-08T22:00:00
...																

Requesting two time windows of data for two IU stations with different channel selections using a POST request:

<http://service.iris.edu/fdsnws/station/1/query>

POST message body:

```
level=channel
includerestricted=FALSE
IU COLA 00 LH? 2012-01-01T00:00:00 2012-01-01T12:00:00
IU ANMO 10 BH? 2013-07-01T00:00:00 2013-02-07T12:00:00
```

The following methods shall be supported by the service:

- to submit a data request
- to submit a request for available catalogs
- to submit a request for available contributors
- to request the full service version number
- to request a WADL for the interface

Requests using the *query* method:

The service shall accept requests formulated using the selection parameters identified in Table : *simple-time* and *geographic constraints* and the parameters listed that are specific for . Table contains parameter descriptions for this service.

Table 5. Parameter descriptions for the **fdsnws-event** service.

Parameter	Support	Description
starttime	Required	Limit to events on or after the specified start time.
endtime	Required	Limit to events on or before the specified end time.
minlatitude	Required	Limit to events with a latitude larger than or equal to the specified minimum.
maxlatitude	Required	Limit to events with a latitude smaller than or equal to the specified maximum.
minlongitude	Required	Limit to events with a longitude larger than or equal to the specified minimum.
maxlongitude	Required	Limit to events with a longitude smaller than or equal to the specified maximum.
latitude	Optional	Specify the latitude to be used for a radius search.
longitude	Optional	Specify the longitude to be used for a radius search.
minradius	Optional	Limit to events within the specified minimum number of degrees from the geographic point defined by the latitude and longitude parameters.
maxradius	Optional	Limit to events within the specified maximum number of degrees from the geographic point defined by the latitude and longitude parameters.
mindepth	Required	Limit to events with depth more than the specified minimum.
maxdepth	Required	Limit to events with depth less than the specified maximum.
minmagnitude	Required	Limit to events with a magnitude larger than the specified minimum.
maxmagnitude	Required	Limit to events with a magnitude smaller than the specified maximum.
magnitudetype	Optional	Specify a magnitude type to use for testing the minimum and maximum limits.
includeallorigins	Optional	Specify if all origins for the event should be included, default is data center dependent but is suggested to be the preferred origin only.
includeallmagnitudes	Optional	Specify if all magnitudes for the event should be included, default is data center dependent but is suggested to be the preferred magnitude only.
includearrivals	Optional	Specify if phase arrivals should be included.
eventid	Optional	Select a specific event by ID; event identifiers are data center specific.
limit	Optional	Limit the results to the specified number of events.
offset	Optional	Return results starting at the event count specified, starting at 1.
orderby	Required	Order the result by time or magnitude with the following possibilities: <i>time</i> : order by origin descending time <i>time-asc</i> : order by origin ascending time <i>magnitude</i> : order by descending magnitude <i>magnitude-asc</i> : order by ascending magnitude
catalog	Optional	Limit to events from a specified catalog
contributor	Optional	Limit to events contributed by a specified contributor.
updatedafter	Optional *	Limit to events updated after the specified time. * While this option is not required it is highly recommended due to usefulness.
format	Optional	Specify format of result, either 'xml' (default) or 'text' (defined below). If this parameter is not specified the service must return QuakeML.
nodata	Optional	Select status code for "no data", either '204' (default) or '404'.

These parameters should be submitted as key value pairs using the HTTP GET method and may not be specified more than once; if a parameter is submitted multiple times the result is undefined.

Responses for the **query** method:

The results of a successful request shall be returned as QuakeML . using MIME type by default or when the *format* parameter value is 'xml'. If the *format* parameter value is 'text' the results shall be returned in a simple ASCII format using MIME type as defined below.

Behavior for the **catalogs** method

The service shall return the return the list of available catalogs in the simple XML schema illustrated below using the MIME type . Any parameters submitted with the method will be ignored.

```
Catalogs
Catalog EMSC Catalog
Catalog GCMT Catalog
Catalog NEIC PDE Catalog
Catalog ISC Catalog
Catalogs
```

Behavior for the **contributors** method

The service shall return the return the list of available contributors in the simple XML schema illustrated below using the MIME type . Any parameters submitted with the method will be ignored.

```
Contributors
Contributor NEIC Contributor
Contributor EMSC Contributor
Contributor ISC Contributor
Contributors
```

Behavior for the **version** method

The service shall return the return the implementation version as a simple text string using the MIME type . Any parameters submitted with the method will be ignored.

Behavior for the **application.wadl** method

The service shall return a WADL conformant description of the interface using the MIME type . Any parameters submitted with the method will be ignored. The WADL shall describe all parameters supported by the interface and is primarily used to document which optional parameters are supported.

Behavior for the conditions

All errors returned to the client shall use the type and pattern described in the Common Service Responses section.

Text output format

This simple text output format contains one event per line with common fields separated by vertical bar characters ASCII decimal `|`. Field entries cannot contain vertical bar characters. Lines beginning with a hash character `#` : ASCII decimal `35` should be considered comment lines.

```
EventID|Time|Latitude|Longitude|Depth/km|Author|Catalog|Contributor|ContributorID|Ma-
gType|Magnitude|MagAuthor|EventLocationName
EventID|Time|Latitude|Longitude|Depth/km|Author|Catalog|Contributor|ContributorID|Ma-
gType|Magnitude|MagAuthor|EventLocationName
...
```

As multiple origins, multiple magnitudes and arrivals cannot be represented in the text format, service implementations should ignore the 'includeallorigins', 'includeallmagnitudes' and 'includearrivals' parameters when the text output has been selected.

The description for each column of the text format is as follows:

EventID	Event ID assigned by the data center, as to be used with <i>eventid</i> parameter
Time	Origin time of the event in UTC
Latitude	Event latitude in degrees
Longitude	Event longitude in degrees
Depth km	Event depth in kilometers
Author	Identifier of event origin author
Catalog	Identifier of source catalog
Contributor	Identifier of event information contributor
ContributorID	Event ID as reported by the contributor
MagType	Magnitude scale identifier e.g. mb, ML, Mw
Magnitude	Magnitude value
MagAuthor	Identifier of magnitude author
EventLocationName	Geographic description of event location e.g. Flinn-Engdahl region name

Requesting origins for all events above magnitude `in` :

<http://service.iris.edu/fdsnws/event/1/query?minmag=6&starttime=2012-01-01T00:00:00&endtime=2013-01-01T00:00:00>

Requesting origins above magnitude `in` in text format:

<http://service.iris.edu/fdsnws/event/1/query?minmag=7&starttime=2000-01-01T00:00:00&endtime=2001-01-01T00:00:00&format=text>

```
959669|2000-12-06T17:11:06|39.493|54.811|33.0|ISC|ISC|ISC|4412116|Mw|7.0|NEIC|TURKMENISTAN
1064984|2000-11-17T21:01:56|-5.517|151.801|31.3|ISC|ISC|ISC|4372218|Mw|7.4|NEIC|NEW BRITAIN REGION, P.N.G.
1039857|2000-11-16T07:42:17|-5.22|153.073|34.2|ISC|ISC|ISC|4371708|Mw|7.3|NEIC|NEW IRELAND REGION, P.N.G.
1036668|2000-11-16T04:54:56|-3.975|152.182|28.0|ISC|ISC|ISC|4371635|Mw|7.6|NEIC|NEW IRELAND REGION, P.N.G.
...
```


SEED data format - <http://www.iris.edu/manuals/SEEDManualV1.2.pdf>

QuakeML - <https://quake.ethz.ch/quakeml/>

FDSN StationXML - <http://www.fdsn.org/xml/station/>

Web Application Description Language WADL - <http://www.w3.org/Submission/wadl/>

Initial specification, release candidate

Remove `Total` elements from `Station` and `StationXML` XML responses for `Station`.
Designate the `Station` specification as provisional until the FDSN StationXML schema is defined.

Include examples request URI s for each service.

. release candidate

Add description and clarification for the columns of the text formats for and

Avoid ambiguity of required parameters by re-naming the appropriate column Support and changing the values to Required and Optional .

Add another example request to the interface illustrating a query for text data and a portion of the response that might be expected.

. release candidate

Add section describing WADL conventions.

Clarify that when the *format* parameter is not specified the default format must be returned.

Clarify that an HTTP status shall be returned when either the request entity itself is too large or the resulting data set would be too large, the latter being an extension of the standard meaning.

Version . final

Clarify limitations of text output format: vertical bars cannot be included in fields, multiple origins & magnitudes cannot be included, phase arrivals cannot be included.

Document intended behavior for the *matchtimeseries* parameter of *fdsnws-station*.

Change minimum value for the *limit* parameter to to , previously .

Reformat Table so complete table is visible.

Re-number tables, Table was previously used for two different tables.