

[MS-FSICFG]: Indexer Configuration File Format

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Table of Contents

1 Introduction	4
1.1 Glossary	4
1.2 References	4
1.2.1 Normative References	4
1.2.2 Informative References	5
1.3 Structure Overview (Synopsis)	5
1.3.1 Options	6
1.3.2 Network	7
1.3.3 Index scheduling	7
1.3.4 Post processors	7
1.3.5 Fault-tolerance	7
1.4 Relationship to Protocols and Other Structures	8
1.5 Applicability Statement	8
1.6 Versioning and Localization	8
1.7 Vendor-Extensible Fields	8
2 Structures	9
2.1 Global elements	9
2.2 Complex Types	9
2.2.1 CT_options	9
2.2.2 CT_network	11
2.2.3 CT_index-scheduling	12
2.2.4 CT_post-processors	13
2.2.5 CT_processor	13
2.2.6 CT_ft	13
2.2.7 CT_real-time-properties	14
3 Structure Examples	15
4 Security Considerations	17
5 Appendix A: Full XML Schema	18
6 Appendix B: Product Behavior	20
7 Change tracking	21
8 Index	22

1 Introduction

This document specifies the Indexer Configuration File Format, an XML-based configuration format for configuring the **indexing nodes** in an enterprise search service. This format describes configuration parameters for changing general behavior and timing intervals, and for changing parameters for performance tuning.

1.1 Glossary

The following terms are defined in [\[MS-GLOS\]](#):

fault-tolerant

The following terms are defined in [\[MS-OFCGLOS\]](#):

base port
exclusion list
FAST Index Markup Language (FIXML)
index column
index partition
indexer row
indexing component
indexing node
item
master indexer node
query matching component
query matching node
Web crawler

The following terms are specific to this document:

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as described in [\[RFC2119\]](#). All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information. Please check the archive site, <http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624>, as an additional source.

[ISO/IEC-29500-4] International Organization for Standardization, "Information technology -- Document description and processing languages -- Office Open XML File Formats -- Part 4: Transitional Migration Features", ISO/IEC 29500-4:2008, http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=51462

[MS-FSCX] Microsoft Corporation, "[Configuration \(XML-RPC\) Protocol Specification](#)", November 2009.

[MS-FSIFT] Microsoft Corporation, "[Indexer Fault Tolerance Protocol Specification](#)", February 2010.

[RFC2119] 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>

[XMLSCHEMA] World Wide Web Consortium, "XML Schema", September 2005, <http://www.w3.org/2001/XMLSchema>

1.2.2 Informative References

[MS-FSFIXML] Microsoft Corporation, "[FIXML Data Structure](#)", November 2009.

[MS-FSIPA] Microsoft Corporation, "[Index Publication and Activation Protocol Specification](#)", February 2010.

[MS-GLOS] Microsoft Corporation, "[Windows Protocols Master Glossary](#)", March 2007.

[MS-OFCGLOS] Microsoft Corporation, "[Microsoft Office Master Glossary](#)", June 2008.

1.3 Structure Overview (Synopsis)

This document describes the Indexer Configuration File Format, an XML-based configuration format for configuring the indexing nodes in an enterprise search service. This format includes configuration parameters both for changing general behavior and timing intervals, as well as parameters for performance tuning.

Item operations, such as adding new items or removing old items, are sent to the indexing node in batches containing several operations. Due to load balancing at higher levels, items sent by a **Web crawler**, for example, can arrive at the indexer in a different order than that in which they were initially sent. Batches that arrive out of order are first placed on the **spare queue**. Batches that arrive in the correct order are placed on the **api queue**. After a batch has been placed on the api queue, the spare queue is checked for batches that could be placed on the api queue to form a contiguous range of batches. There is one spare queue for every client feeding the indexing node.

On the highest level, the total index is partitioned across several **index columns** of indexing nodes. On the level of each indexing node, the index is partitioned into a disjointed set of **index partitions**. These index partitions are denoted by integers from 0 to n-1, where n is the number of index partitions on the indexing node. A full set of disjoint index partitions is called an index set, and the set of index partitions currently used by **query matching nodes** to facilitate search queries is called the active index set.

In a **fault-tolerant** system setup there are several indexing nodes in the same index column, with indexing nodes assuming different **column roles**. In every index column, one of the indexing nodes assumes the role of the **master indexer node**, while the rest are referred to as backup indexing nodes. The different indexing nodes are identified by their **indexer row** identifier, as shown in the following figure.

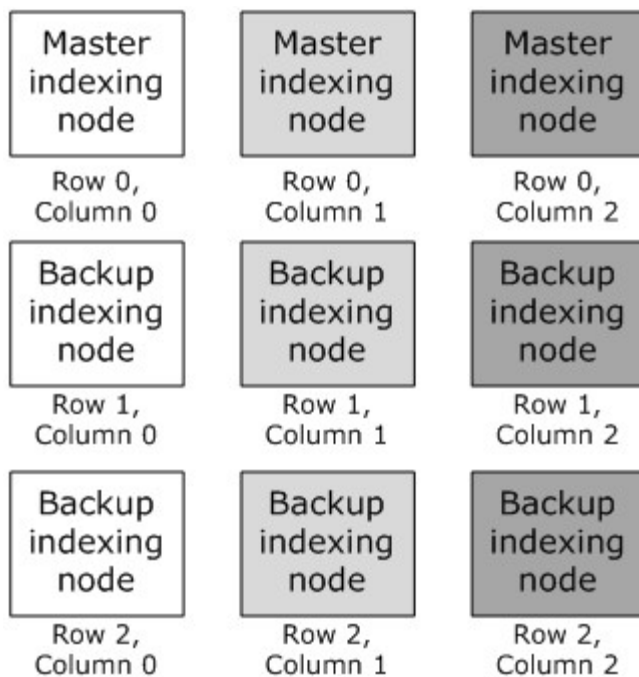


Figure 1: Matrix of indexing nodes

Prior to indexing, items are stored in the intermediate **FAST Index Markup Language (FIXML)** format, as described in [\[MS-FSFIXML\]](#). A single FIXML structure contains one or more items. The validity of the items in a FIXML structure is decided by its corresponding FIXML meta structure.

The high level item operations are converted by the master indexer node into low level sequence operations, as described in [\[MS-FSIFT\]](#) section 2.2.2. Each indexing node keeps a fault-tolerance storage, which is a backlog of previously-processed sequence operations. The fault-tolerance storage enables a restarted backup indexing node to quickly become fully synchronized; the master indexer node is only required to send the sequence operations that were not delivered during the backup indexing node's downtime.

Query matching nodes register with the master indexer node using the protocol described in [\[MS-FSIPA\]](#). Some of the query matching node's configuration parameters are derived from the configuration format specified in this document.

The configuration parameters are grouped into different child elements of the root element. The child elements containing the actual parameters are described in the following sections.

1.3.1 Options

General options are grouped into a single child element, which specifies the following information:

- The encoding of the FIXML files
- The sizes of the index partitions
- The maximum number of items stored in each FIXML file
- The maximum number of FIXML set directories allowed

- The maximum number of FIXML files allowed
- The minimum amount of disk space allowed before warnings are logged
- The level of logging
- The number of index partitions
- The interval at which **exclusion lists** are sent to the query matching nodes
- The number of index partitions allowed to re-index simultaneously
- The way in which dictionary normalization is performed
- The interval at which dictionary normalization takes place
- The directory in which FIXML files are stored
- The directory in which the inverted index structures are stored
- The maximum size of the api queue

1.3.2 Network

A single child element stores specified network options that include the following:

- The fully qualified host name of the indexing node
- The **base port** of the indexing node

1.3.3 Index scheduling

The index scheduling options are grouped into a single child element specifying several items, including the following:

- The type of index scheduling algorithm used
- The parameters of the index scheduling algorithm, informing when an index partition is to be re-indexed

1.3.4 Post processors

The post processors options are grouped into a single child element specifying items that include the following:

- The external processes that work on the index structures

1.3.5 Fault-tolerance

The fault-tolerance options are grouped into a single child element specifying items that include the following:

- The enabling or disabling of fault-tolerance
- The location of the fault-tolerance storage
- The interval at which indexing nodes reassess their column role

- The maximum amount of disk space used by the fault-tolerance storage

1.4 Relationship to Protocols and Other Structures

The configuration file described in this file format specification is downloaded by the **indexing components** from the configuration service described in [\[MS-FSCX\]](#).

1.5 Applicability Statement

This file format can be used to configure indexing nodes in an enterprise search service.

1.6 Versioning and Localization

None.

1.7 Vendor-Extensible Fields

None.

2 Structures

The Indexer Configuration File Format is defined in XML schema, as specified in [\[XMLSCHEMA\]](#).

The indexing components retrieve the configuration structure specified in this document by calling the **LoadConfigFile** method, as specified in [\[MS-FSCX\]](#) section 2.2.26. The **LoadConfigFile** method utilizes the following parameters:

module: A string value that MUST be "RTSearch".

filepath: A string value that MUST be "webcluster/rtsearchrc.xml".

2.1 Global elements

The global element contains an indexing node's configuration parameters. An Indexer Configuration File structure MUST contain only one **configuration** XML element.

```
<xs:element name="configuration" type="CT_configuration" />
```

2.2 Complex Types

2.2.1 CT_options

Referenced by: CT_configuration.

The **CT_Options** complex type specifies the general configuration parameters of an indexing node.

Child elements: None.

Attributes:

Name	Description
xmlEncoding	A string value specifying the value to be inserted into the encoding attribute of the FIXML files. If the length of the string is less than or equal to 1, the encoding attribute MUST NOT be inserted.
docsDistributionMax	A comma-separated list of integers specifying the upper limit of allowed items in an index partition. The values are given in increasing index partition order, where the first integer value corresponds to index partition 0.
numberDocsPerFixml	An integer value specifying the maximum number of items per FIXML file.
docsDistributionSteps	An integer value specifying implementation specific distribution data, which SHOULD be "100".
docsDistributionSamples	An integer value specifying implementation specific distribution data, which SHOULD be "100".
fsearchCachePstDist	A comma-separated list of integers specifying implementation specific cache distribution percentages, which SHOULD be "5,20,7,20,0,5,3,0,4,5,11,0,20".
maxMBCacheSize	This value may be specified in two ways: An integer value specifying the maximum memory usage, in megabytes,

Name	Description
	of the query matching component . An integer value specifying the percentage of total physical memory that is allowed for use by the query matching component, followed by a percentage sign.
maxSetDirs	An integer value specifying the maximum number of FIXML set directories allowed. FIXML files are identified by increasing sequence identifiers, starting at 0. These sequence identifiers are then mapped to filenames and directories using the following algorithm: <pre>FILENAME = sequence identifier % 250 DIRECTORY = sequence identifier / 250</pre>
maxFixmlFiles	An integer value specifying the maximum number of FIXML files allowed.
fixmlPrefetchThreads	An integer value specifying an implementation specific number of threads, which SHOULD be "20".
diskspaceMBWarning	An integer value specifying the smallest amount of disk space, in megabytes, allowed before warnings will be logged. Warnings MUST be logged if the available disk space is less than the configuration value for either of the following folders: The directory containing the fault-tolerance storage. The directory containing the inverted index structures. The directory containing the FIXML files.
indexerSwapDetect	A string value specifying the sizes of implementation specific memory structures, which SHOULD be "-k 600 -K 1200".
debugLog	A Boolean value specifying whether or not debug level logging is enabled.
numberPartitions	An integer value specifying the number of index partitions on the indexing node.
exclusionlistInterval	An integer value specifying the number of seconds that MUST pass between the time exclusion list updates that are sent to the query matching nodes.
indexingThreads	An integer value specifying the number of implementation specific threads, which SHOULD be "4".
maxActiveIndexingJobs	An integer value specifying the maximum number of index partitions that are allowed to re-index simultaneously.
removeCollectionBatchSize	An integer value specifying implementation specific batch sizes, which SHOULD be "5000".
normalizeMode	A string value specifying when index normalization occurs. Index normalization is a scheme to normalize individual index partitions so that their term frequencies are relative to the entire index set, rather than the individual index partitions. The value MUST be either "synchronized" or "periodic". If the parameter is set to "synchronized", the normalization MUST occur directly after an index partition has been re-indexed. If the parameter is set to "periodic", the index partitions MUST be rank normalized at set time intervals, as configured using normalizeInterval .
normalizeInterval	An integer value specifying the number of seconds that MUST pass between index normalizations. This value is only valid if normalizeMode

Name	Description
	is set to "periodic".
fixmlPath	A string value specifying the directory in which the FIXML files are stored.
indexDir	A string value specifying the directory in which the inverted index structures are stored.
maxQueueSize	An integer value specifying the maximum size, in bytes, of the api queue and the spare queue.
maxMemPerDocIndex	An integer value specifying implementation specific memory management data, which SHOULD be "500".

```

<xs:complexType name="CT_options">
  <xs:attribute name="xmlEncoding" type="xs:string" use="required"/>
  <xs:attribute name="docsDistributionMax" type="xs:string" use="required"/>
  <xs:attribute name="numberDocsPerFixml" type="xs:int" use="required"/>
  <xs:attribute name="docsDistributionSteps" type="xs:int" use="required"/>
  <xs:attribute name="docsDistributionSamples" type="xs:int" use="required"/>
  <xs:attribute name="fsearchCachePstDist" type="xs:string" use="required"/>
  <xs:attribute name="maxMBCacheSize" type="xs:string" use="required"/>
  <xs:attribute name="maxSetDirs" type="xs:int" use="required"/>
  <xs:attribute name="maxFixmlFiles" type="xs:int" use="required"/>
  <xs:attribute name="fixmlPrefetchThreads" type="xs:int" use="required"/>
  <xs:attribute name="diskspaceMBWarning" type="xs:int" use="required"/>
  <xs:attribute name="indexerSwapDetect" type="xs:string" use="required"/>
  <xs:attribute name="debugLog" type="xs:boolean" use="required"/>
  <xs:attribute name="numberPartitions" type="xs:int" use="required"/>
  <xs:attribute name="exclusionlistInterval" type="xs:int" use="required"/>
  <xs:attribute name="indexingThreads" type="xs:int" use="required"/>
  <xs:attribute name="maxActiveIndexingJobs" type="xs:int" use="required"/>
  <xs:attribute name="removeCollectionBatchSize" type="xs:int" use="required"/>
  <xs:attribute name="normalizeMode" type="xs:string" use="required"/>
  <xs:attribute name="normalizeInterval" type="xs:int" use="required"/>
  <xs:attribute name="fixmlPath" type="xs:string" use="required"/>
  <xs:attribute name="indexDir" type="xs:string" use="required"/>
  <xs:attribute name="maxQueueSize" type="xs:int" use="required"/>
  <xs:attribute name="maxMemPerDocIndex" type="xs:int" use="required"/>
</xs:complexType>

```

2.2.2 CT_network

Referenced by: CT_network.

The **CT_network** complex type specifies the network-related configuration parameters of an indexing node.

Child elements: None.

Attributes:

Name	Description
qualifiedHostName	A string value specifying the fully qualified domain name of the indexing node. If the attribute is empty or missing, the host name will be automatically resolved.

Name	Description
useStrictBind	Implementation specific configuration information.
basePort	A string specifying the base port of the indexing service.

```
<xs:complexType name="CT_network">
  <xs:attribute name="qualifiedHostName" type="xs:string" nullable="true"/>
  <xs:attribute name="useStrictBind" type="xs:string" use="required"/>
  <xs:attribute name="basePort" type="xs:string" use="required"/>
</xs:complexType>
```

2.2.3 CT_index-scheduling

Referenced by: CT_index-scheduling.

The **CT_index-scheduling** complex type specifies the index scheduling scheme of the indexing node.

Child elements: None.

Attributes:

Name	Description
type	A string specifying the index-scheduling algorithm used. The supported algorithm is: <ul style="list-style-type: none"> ▪ docCountArchive.
triggers	<p>A comma-separated list of integers specifying the thresholds of the individual index partitions. When the number of items in index partition <i>n-1</i> is greater than the threshold for index partition <i>n</i>, index partition <i>n</i> will be scheduled for re-indexing.</p> <p>The values are given in increasing index partition order, the first integer value corresponding to index partition 1. Index partition 0 does not have a trigger value, as it is automatically triggered as soon as a new item has been added.</p> <p>If the triggers list contains less than <i>n-1</i> values, where <i>n</i> is the number of index partitions, the thresholds of the remaining index partitions will be deduced from the docsDistributionMax attribute of the options child element. If an index partition <i>p</i> does not have a threshold value specified in triggers, it will be scheduled for re-indexing when the total number of items indexed in index partitions 0 through <i>p-1</i> exceeds the docsDistributionMax value for index partition <i>p</i>.</p> <p>An example of this would be a system with the following configuration:</p> <ul style="list-style-type: none"> ▪ 5 index partitions ▪ a docsDistributionMax setting of "12500000,12500000,12500000,12500000,12500000" ▪ a triggers setting of "10000,100000,1000000" <p>The preceding configuration equates to index partition 1 re-indexing when index partition 0 reaches at least 10000 items, index partition 2 re-indexing when index partition 1 reaches at least 100,000 items, and index partition 3 re-indexing when index partition 2 reaches 1,000,000 items. Index partition 4 will be scheduled for re-indexing when the total number of items in index partitions 0 through 3 exceeds 12,500,000 items.</p>

```
<xs:complexType name="index-scheduling">
  <xs:attribute name="type" type="xs:string" use="required"/>
</xs:complexType>
```

```
<xs:attribute name="triggers" type="xs:string" use="required"/>
</xs:complexType>
```

2.2.4 CT_post-processors

Referenced by: CT_post-processors.

The **CT_post-processors** complex type is used to call internal and external custom post-processors acting on the inverted index structures.

Child elements:

processor: the post-processor to call.

Attributes: None.

```
<xs:complexType name="CT_post-processors">
  <xs:sequence>
    <xs:element name="processor" type="CT_processor"/>
  </xs:sequence>
</xs:complexType>
```

2.2.5 CT_processor

Referenced by: <CT_post-processors>

The **CT_processor** complex type specifies internal and external post-processors to call after completion of an inverted index structure.

Child elements: None.

Attributes:

Name	Description
Simple	A Boolean value that MUST be "true" to enable the simple post-processor, or "false" to disable it. The simple post-processor verifies the file sizes of the newly built index structures.
External	A string value specifying the absolute path of an external process that will be executed every time an index partition has been re-indexed. The process will be launched with the absolute path of the directory containing the newly built index structures as the first and only argument.

```
<xs:complexType name="CT_processor">
  <xs:attribute name="simple" type="xs:boolean"/>
  <xs:attribute name="external" type="xs:string"/>
</xs:complexType>
```

2.2.6 CT_ft

Referenced by: CT_ft.

The **CT_ft** complex type specifies the configuration parameters related to fault-tolerance, as specified in [\[MS-FSIFT\]](#).

Child elements: None.

Attributes:

Name	Description
Enabled	A Boolean value that MUST be "true" if fault-tolerance is to be enabled, or "false" if it is not.
storagePath	A string value specifying the directory in which the fault-tolerance storage is placed.
idleHeartbeatTime	An integer value specifying how often the indexing node is to reassess its column role.
maxStorageSizeMB	An integer value specifying the maximum size, in megabytes, allowed for the fault-tolerance storage. If the value is exceeded, the fault-tolerance storage will be truncated, starting with the oldest content, until the size limit is met.

```
<xs:complexType name="CT_ft">  
  <xs:attribute name="enabled" type="xs:boolean" use="required"/>  
  <xs:attribute name="storagePath" type="xs:string" use="required"/>  
  <xs:attribute name="idleHeartbeatTime" type="xs:int" use="required"/>  
  <xs:attribute name="maxStorageSizeMB" type="xs:int" use="required"/>  
</xs:complexType>
```

2.2.7 CT_real-time-properties

Referenced by: CT_real-time-properties.

The **CT_real-time-properties** complex type is not in use and MUST be ignored.

Child elements: None.

Attributes: None.

```
<xs:complexType name="CT_real-time-properties">  
</xs:complexType>
```

3 Structure Examples

The following example shows the default configuration for an enterprise search service. Directory paths are dependent on user choices made during system installation. The default configuration is devised to suit the vast majority of installations.

```
<?xml version="1.0" encoding="utf-8"?>
<configuration>
  <options
    xmlEncoding          = ""
    docsDistributionMax  = "12500000,12500000,12500000,12500000,12500000"
    numberDocsPerFixml  = "200"
    docsDistributionSteps = "100"
    docsDistributionSamples = "100"
    fsearchCachePstDist = "5,15,5,15,4,15,6,0,4,6,11,0,14"
    maxMBCacheSize      = "1000"
    maxSetDirs          = "400000"
    maxFixmlFiles       = "50000000"
    fixmlPrefetchThreads = "20"
    diskSpaceMBWarning  = "3000"
    indexerSwapDetect   = "-k 600 -K 1200"
    debugLog            = "false"
    numberPartitions    = "5"
    exclusionlistInterval = "60"
    indexingThreads     = "4"
    maxActiveIndexingJobs = "3"
    removeCollectionBatchSize = "5000"
    normalizeMode       = "periodic"
    normalizeInterval   = "1800"
    fixmlPath           = "c:/fastsearch/data/data_fixml"
    indexDir            = "c:/fastsearch/data/data_index"
    maxQueueSize        = "262144000"
    maxMemPerDocIndex   = "500"
  />

  <network
    qualifiedHostName    = "www.examplehost.com"
    useStrictBind       = "false"
    basePort            = "13050"
  />

  <index-scheduling type          = "docCountArchive"
                   triggers      = "10000,100000,1000000"
  />

  <post-processors>
    <processor simple          = "true"/>
  </post-processors>

  <ft
    enabled              = "false"
    storagePath         = "c:/fastsearch/data/ftStorage"
    idleHeartbeatTime   = "120"
    maxStorageSizeMB    = "51200"
  />
  <real-time-properties/>

```

</configuration>

4 Security Considerations

None.

5 Appendix A: Full XML Schema

For ease of implementation, the following full W3C XML schema for the elements, complex types, and attributes specified in the preceding sections is provided. Any schema references to namespaces included in ISO/IEC-29500:2008 refer specifically to the transitional schemas, as specified in [\[ISO/IEC-29500-4\]](#).

```
<?xml version="1.0" encoding="utf-8" ?>
<xs:schema attributeFormDefault="unqualified" elementFormDefault="qualified"
  xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <!-- ***** Global elements ***** -->

  <xs:element name="configuration" type="CT_configuration" />

  <!-- ***** Complex types ***** -->

  <xs:complexType name="CT_configuration">
    <xs:sequence>
      <xs:element name="options" type="CT_options"/>
      <xs:element name="network" type="CT_network"/>
      <xs:element name="index-scheduling" type="CT_index-scheduling"/>
      <xs:element name="post-processors" type="CT_post-processors"/>
      <xs:element name="ft" type="CT_ft"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="CT_options">
    <xs:attribute name="xmlEncoding" type="xs:string" use="required"/>
    <xs:attribute name="docsDistributionMax" type="xs:string" use="required"/>
    <xs:attribute name="numberDocsPerFixml" type="xs:int" use="required"/>
    <xs:attribute name="docsDistributionSteps" type="xs:int" use="required"/>
    <xs:attribute name="docsDistributionSamples" type="xs:int" use="required"/>
    <xs:attribute name="fsearchCachePstDist" type="xs:string" use="required"/>
    <xs:attribute name="maxMBCacheSize" type="xs:string" use="required"/>
    <xs:attribute name="maxSetDirs" type="xs:int" use="required"/>
    <xs:attribute name="maxFixmlFiles" type="xs:int" use="required"/>
    <xs:attribute name="fixmlPrefetchThreads" type="xs:int" use="required"/>
    <xs:attribute name="diskspaceMBWarning" type="xs:int" use="required"/>
    <xs:attribute name="indexerSwapDetect" type="xs:string" use="required"/>
    <xs:attribute name="debugLog" type="xs:boolean" use="required"/>
    <xs:attribute name="numberPartitions" type="xs:int" use="required"/>
    <xs:attribute name="exclusionlistInterval" type="xs:int" use="required"/>
    <xs:attribute name="indexingThreads" type="xs:int" use="required"/>
    <xs:attribute name="maxActiveIndexingJobs" type="xs:int" use="required"/>
    <xs:attribute name="removeCollectionBatchSize" type="xs:int" use="required"/>
    <xs:attribute name="normalizeMode" type="xs:string" use="required"/>
    <xs:attribute name="normalizeInterval" type="xs:int" use="required"/>
    <xs:attribute name="fixmlPath" type="xs:string" use="required"/>
    <xs:attribute name="indexDir" type="xs:string" use="required"/>
    <xs:attribute name="maxQueueSize" type="xs:int" use="required"/>
    <xs:attribute name="maxMemPerDocIndex" type="xs:int" use="required"/>
  </xs:complexType>

  <xs:complexType name="CT_network">
    <xs:attribute name="qualifiedHostName" type="xs:string" use="required"/>
    <xs:attribute name="useStrictBind" type="xs:string" use="required"/>
    <xs:attribute name="basePort" type="xs:string" use="required"/>
  </xs:complexType>

```

```
</xs:complexType>

<xs:complexType name="CT_index-scheduling">
  <xs:attribute name="type" type="xs:string" use="required"/>
  <xs:attribute name="triggers" type="xs:string" use="required"/>
</xs:complexType>

<xs:complexType name="CT_post-processors">
  <xs:sequence>
    <xs:element name="processor" type="CT_processor"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="CT_processor">
  <xs:attribute name="simple" type="xs:boolean"/>
  <xs:attribute name="external" type="xs:string"/>
</xs:complexType>

<xs:complexType name="CT_ft">
  <xs:attribute name="enabled" type="xs:boolean" use="required"/>
  <xs:attribute name="storagePath" type="xs:string" use="required"/>
  <xs:attribute name="idleHeartbeatTime" type="xs:int" use="required"/>
  <xs:attribute name="maxStorageSizeMB" type="xs:int" use="required"/>
</xs:complexType>

<xs:complexType name="CT_real-time-properties">
</xs:complexType>

</xs:schema>
```

6 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs:

- Microsoft® FAST™ Search Server 2010

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that the product does not follow the prescription.

7 Change tracking

No table of changes is available. The document is either new or has had no changes since its last release.

8 Index

A

[Applicability](#) 8

C

[Change tracking](#) 21

Common data types and fields ([section 2 9](#), [section 2 9](#))

Complex types

[CT_ft](#) ([section 2.2.6](#) 13, [section 2.2.7](#) 14)

[CT_index-scheduling](#) 12

[CT_network](#) 11

[CT_options](#) 9

[CT_post-processors](#) 13

[CT_processor](#) 13

[CT_ft](#) complex type ([section 2.2.6](#) 13, [section 2.2.7](#) 14)

[CT_index-scheduling complex type](#) 12

[CT_network complex type](#) 11

[CT_options complex type](#) 9

[CT_post-processors complex type](#) 13

[CT_processor complex type](#) 13

D

Data types and fields - common ([section 2 9](#), [section 2 9](#))

Details

common data types and fields ([section 2 9](#), [section 2 9](#))

[CT_ft](#) complex type ([section 2.2.6](#) 13, [section 2.2.7](#) 14)

[CT_index-scheduling complex type](#) 12

[CT_network complex type](#) 11

[CT_options complex type](#) 9

[CT_post-processors complex type](#) 13

[CT_processor complex type](#) 13

[global elements structure](#) 9

E

[Example](#) 15

[Examples](#) 15

F

[Fields - vendor-extensible](#) 8

Full XML schema ([section 5 18](#), [section 5 18](#))

G

[Global elements structure](#) 9

[Glossary](#) 4

I

[Implementer - security considerations](#) 17

[Informative references](#) 5

[Introduction](#) 4

L

[Localization](#) 8

N

[Normative references](#) 4

O

[Overview \(synopsis\)](#) 5

[fault-tolerance](#) 7

[index scheduling](#) 7

[network](#) 7

[options](#) 6

[post processors](#) 7

P

[Product behavior](#) 20

R

References

[informative](#) 5

[normative](#) 4

[Relationship to protocols and other structures](#) 8

S

[Security - implementer considerations](#) 17

Structure overview

[fault-tolerance](#) 7

[index scheduling](#) 7

[network](#) 7

[options](#) 6

[post processors](#) 7

Structures

[global elements](#) 9

overview ([section 2 9](#), [section 2 9](#))

T

[Tracking changes](#) 21

V

[Vendor-extensible fields](#) 8

[Versioning](#) 8

X

XML schema ([section 5 18](#), [section 5 18](#))