

INTRODUCTION TO SBE (simple binary encoding)

Scope and audience: This technical note intends to provide general technical information about SBE, not specifically to the SBE implementation on Optiq® – for the SBE integration and specificities of the SBE messages within Euronext Optiq platform please consult the Optiq specifications [here](#).

This document is meant to familiarize developers who will work with SBE for the first time.

SBE stands for Simple Binary Encoding and it is a OSI layer 6 presentation for encoding and decoding binary application messages with the main purpose of supporting low-latency financial applications.

SBE is a FIX standard for binary message encoding: [FIX Simple Binary Encoding](#).

SBE provides a language independent type system supporting integers, floating point numbers, characters, arrays, constants, enums, bitsets, composites, grouped structures that repeat, and variable length strings and blobs.

SBE has been chosen for the Optiq platform for the enumerated advantages mentioned in the following section.

1. ADVANTAGES OF USING SBE

- Standard: FIX SBE has been developed by the FIX trading community, under the “High Performance FIX” initiative
 - Performance: Fast and compact encoding / decoding of FIX messages
 - Simplicity: Well documented and easy to use, with an open source implementation available
 - Technology adoption: Major exchanges already use SBE.
 - Efficiency: Focus on reducing bandwidth utilization for the market data
 - SBE offers the possibility to have backward and forward compatibility. It means that clients are not required to be on the last version of Schema Version (message structure version) to be able to read the message. This is only possible if changes to SBE messages that are being introduced are:
 - not mandatory
 - done at the end of the block and / or the repeating section.
 - Using the version of the schema system will parse the known fields and skip anything unknown. Please review the “Compatibility Strategy” within the official SBE spec for more details on this mechanism.
-

2. SBE USAGE IN PRACTICE

Messages to be encoded and decoded with SBE are described in a schema in XML format. The XML schema is a machine readable version of the order-entry and market data message specifications.

The XML message schema can be used for automated code generation. An SBE-compatible code generator can use the XML definition as an input and generate encoding/decoding methods in a high level language like Java, C++ or C#.



While using such automated code generation is not mandatory to use FIX SBE, it is expected to significantly reduce development effort on the long run:

- elimination of human errors introduced by manual coding.
- changes to message definition can be directly fed into a continuous integration process to test for impact and regressions.
- An example of such code generation tool-chain has been developed as an open sourced project by [Real Logic] (<http://real-logic.co.uk/>)¹. It is available [HERE](#). Real Logic open sourced code generator is a Java TM tool and currently supports Java, C++, and C# as target language's.

3. SBE MESSAGE STRUCTURE

A general representation of a SBE message structure is provided below.



- Frame – contains the total length of the message, including length of the Frame and SBE Header fields
- SBE Message Header - contains general information about the SBE template used, specifically about Block length, Template ID, Schema ID, Schema version
- SBE Message Body – contains the static mandatory and optional fields of the root block and the optional and conditional fields of the repeating sections. An SBE Message body may have none, one or multiple repeating sections depending on the specificities of the message.

Please check the standard [FIX SBE](#) for a general overview of the SBE Message Structure – please note, access to this page requires registration.

Use the Optiq MDG and OEG specifications [HERE](#), for more specific information about OPTIQ SBE message structure.

4. SBE XML SCHEMA AND OPTIQ INTEGRATION

The SBE XML schema is the template XML file used by the SBE encoder / decoder to encode or decode SBE messages. The SBE XML schema, matching the specification, as well as an XML schema sample, will be available for download on the Optiq website.

There are several elements which build an SBE XML schema:

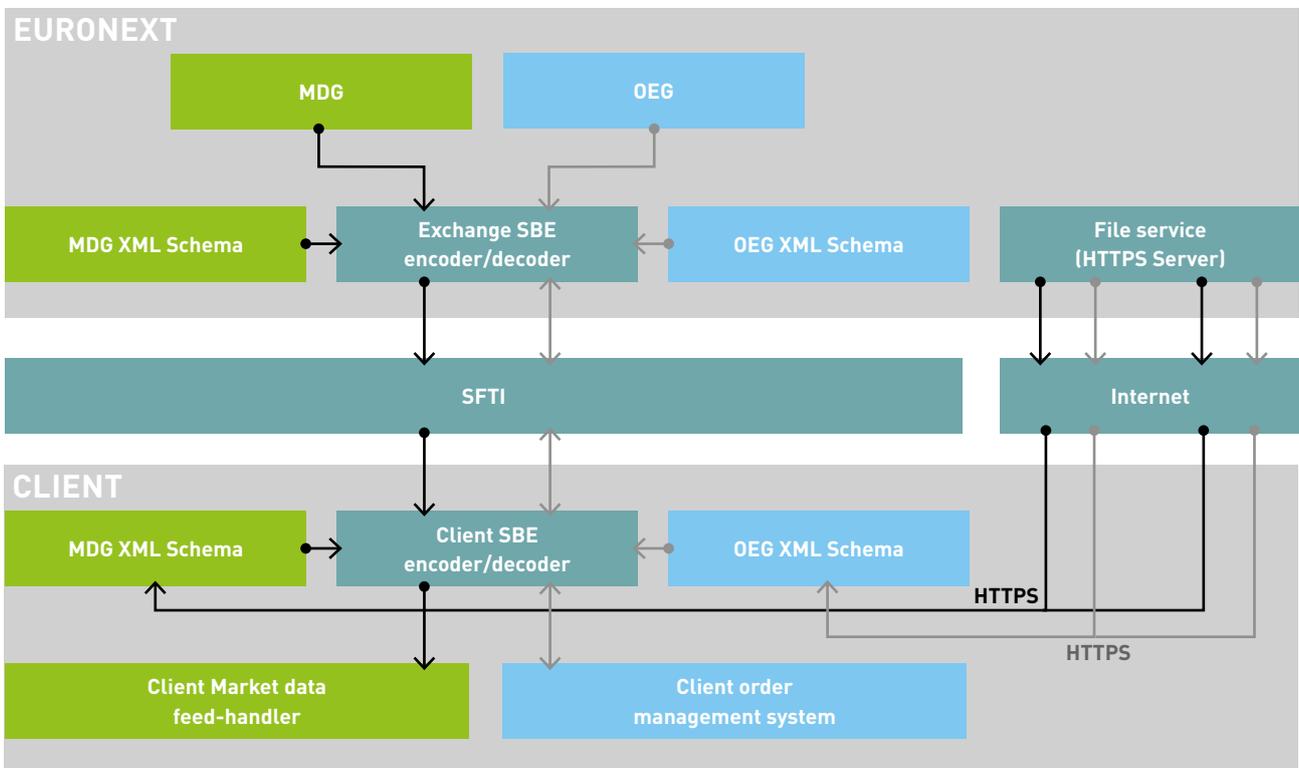
- Message schema, Types (type, set, enum, composite), Message, Field, Group, Data.

Each of the above mentioned elements are being described [HERE](#).

An example of such general SBE schema can be found [HERE](#).

Below, specific to Euronext and its clients, is a diagram of the usage and integration of the SBE Encoder and SBE XML template (schema) within MDG (Market Data Gateway) and OEG (Order Entry Gateway).

This diagram applies to the Optiq Production Environment.



Notes to the diagram:

- Exchange and Client SBE Encoder / Decoder are different.
- MDG and OEG XML schema are the same.

Optiq SBE XML template files for both MDG and OEG will be made available for download on the Optiq File Service.

Disclaimer

This publication is for information purposes only and is not a recommendation to engage in investment activities. This publication is provided "as is" without representation or This document contains information which is confidential and of value to Euronext. The information and materials contained in this document are provided 'as is' and Euronext does not warrant the accuracy, adequacy or completeness and expressly disclaims liability for any errors or omissions or changes enabled to be made for any reason included correction, update and upgrade purpose. This document contains links to certain Internet Websites developed, sponsored or maintained by third parties unaffiliated with Euronext. The content you view therein is not provided or controlled by Euronext. Euronext is not responsible for that content, nor has it developed, checked for accuracy or otherwise reviewed the content or privacy policy of any such third party Website. This document is not intended to impose any legal obligation on Euronext. This document and any contents thereof, as well as any prior or subsequent information exchanged with Euronext in relation to the subject matter of this document, are confidential and are for the sole attention of the intended recipient. Except as described below, all proprietary rights and interest in or connected with this publication shall vest in Euronext. No part of it may be redistributed or reproduced without the prior written permission of Euronext. Portions of this publication may contain materials or information copyrighted, trademarked or otherwise owned by a third party. No permission to use these third party materials should be inferred from this publication. Implementation of the project may be subject to regulatory approval.

Euronext refers to Euronext N.V. and its affiliates. Information regarding trademarks and intellectual property rights of Euronext is located at <https://www.euronext.com/terms-use>.

© 2016 Euronext N.V. - All rights reserved.

SBE Disclaimer

Copyright 2014 - 2016 Real Logic Limited

Licensed under the Apache License, Version 2.0 (the "License"); you may not use this file except in compliance with the License. You may obtain a copy of the License at <http://www.apache.org/licenses/LICENSE-2.0>.

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

ANY USE OF THE Simple Binary Encoding (SBE) SHALL BE MADE UNDER THE SOLE RESPONSIBILITY OF CUSTOMER AND EURONEXT NV AND ITS AFFILIATES HEREBY DISCLAIM ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ANY USE OF THE SBE BY THE CUSTOMER AND/OR ANY OF ITS AFFILIATES; IN NO EVENT SHALL EURONEXT NV AND/OR ANY OF ITS AFFILIATES BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THE SBE EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.