**Title:** METHOD FOR DESCRIBING FINANCIAL INSTRUMENTS

**Abstract:** A method is provided for communicating a description of a bond between a first entity and a second entity and includes the step of selecting at least some attributes that are associated with the bond from a plurality of bond attributes. Next, a value for each of the at least some attributes is chosen. Next, the description of the bond is created by formatting the values for the at least some attributes according to a document type definition. Finally, the description of the bond is communicated between the first entity and the second entity.
METHOD FOR DESCRIBING FINANCIAL INSTRUMENTS

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of the filing date of U.S. provisional application serial number 60/343,696 entitled “Method for Describing Financial Instruments” which was filed on December 27, 2001.

BACKGROUND

The following invention relates to a method for describing financial instruments and, in particular, to a method for improving the efficiency of communicating information pertaining to debt instruments.

Debt instruments are complex investment products the performance of which typically depends on a several basic characteristics. For example, a bond’s price-yield relationship depends on its maturity, redemption features, coupon features (for e.g., step ups) and the convention in the underlying market (for e.g., the yield calculation method). In addition to these basic features, a particular bond may include other features that affect the bond’s yield including, by way of example, the type of coupon provided, the settlement date, the ex-dividend date, the type of accrual, the amortization rate, the capitalization date and the recovery right. In all there are approximately 40 features that effect bond yield. For any given bond, however, only a subset of these features may be relevant to describe the yield of the particular bond.

Because the yield of a bond depends on numerous characteristics that can vary depending on the bond type, it is important that those transacting in a particular bond clearly and accurately document the features of the bond to avoid any misunderstandings between the transacting parties. Presently, however, there is no uniform method for accurately describing the numerous features of a bond. The need for an accurate and uniform method for describing bond
information is particularly great in situations where the bond information is to be electronically communicated between two systems (for example, a client device requesting a price quote from a pricing engine). In this context, not having a method for accurately and uniformly describing bond characteristics may result in different systems being unable to accurately and effectively communicate bond information.

Accordingly, it is desirable to provide a method for describing debt instruments and for improving the efficiency of communicating information pertaining to debt instruments.

**SUMMARY OF THE INVENTION**

The present invention is directed to overcoming the drawbacks of the prior art. Under the present invention a method is provided for communicating a description of a bond between a first entity and a second entity and includes the step of selecting at least some attributes that are associated with the bond from a plurality of bond attributes. Next, a value for each of the at least some attributes is chosen. Next, the description of the bond is created by formatting the values for the at least some attributes according to a document type definition. Finally, the description of the bond is communicated between the first entity and the second entity.

In an exemplary embodiment, the bond attributes include maturity and redemption.

In another exemplary embodiment, the bond attributes includes at least one attribute selected from the group including a coupon type, a settlement date, an ex-dividend date, an accrual type, an amortization rate, a capitalization date, a tax status and a recovery right.

In yet another exemplary embodiment, the bond has a yield and at least some of the at least some attributes relate to the yield of the bond.
In still yet another exemplary embodiment, the at least some of the at least some of the attributes identify the bond.

In an exemplary embodiment, the document type definition conforms to an Extensible Markup Language syntax.

In another exemplary embodiment, the bond is a corporate bond.

In yet another exemplary embodiment, the bond is a government bond.

In still yet another exemplary embodiment, the bond is an emerging market bond.

Under the present invention, a method for forming a description of a bond is provided and includes the step of selecting at least some attributes that are associated with the bond from a plurality of bond attributes. Next, a value for each of the at least some attributes is chosen. Finally, the description of the bond is created by formatting the values for the at least some attributes according to a document type definition.

In an exemplary embodiment, a first entity and a second entity is included and the method includes the step of communicating the description of the bond between the first entity and the second entity.

Under the present invention, a system for communicating a description of a bond is provided and includes a first entity that selects at least some attributes that are associated with the bond from a plurality of bond attributes. The first entity also chooses a value for each of the at least some attributes and the first entity then creates the description of the bond by formatting the values for the at least some attributes according to a document type definition. Also included is a second entity that is in communications with the first entity. When the first entity communicates the description of the bond to the second entity, the second entity interprets the description according to the document type definition.
In an exemplary embodiment, the first entity includes an XML processor for formatting the values for the at least some attributes according to a document type definition.

In another exemplary embodiment, the second entity includes an XML processor for interpreting the description according to the document type definition.

Accordingly, a method is provided for describing debt instruments and for improving the efficiency of communicating information pertaining to debt instruments.

The invention accordingly comprises the features of construction, combination of elements and arrangement of parts that will be exemplified in the following detailed disclosure, and the scope of the invention will be indicated in the claims. Other features and advantages of the invention will be apparent from the description, the drawings and the claims.

**DESCRIPTION OF THE DRAWINGS**

For a fuller understanding of the invention, reference is made to the following description taken in conjunction with the accompanying drawing, in which:

FIG. 1 is a block diagram of a system in which bond information is communicated according to the method of the present invention.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Referring now to Appendix B, there is shown an Extensible Markup Language (XML) document type definition (DTD) for describing a bond in accordance with an exemplary embodiment of the present invention. XML is an open technology standard designed to facilitate structured data interchange on the World Wide Web. The XML standard includes the use of document type definitions that provide a formal description format for specific documents using XML syntax. More specifically, a DTD typically sets out the names that are to be used for the
different types of element, where they may occur within the document and the ways the different elements may combine for a particular document type. XML and the use of document type definitions are well known in the industry.

As described above, a bond’s yield may depend on any number of attributes (see Appendix A for a listing and description of these attributes). For example, Appendix B illustrates a DTD 101 that may be used for describing bonds by using various bond attributes including attributes that pertain to bond identification, calendar, issue date, settlement date, ex-dividend date, accrual information, price, yield, payment periods, coupons, capitalization, amortization, step up date, value recovery right, option schedule and rolling guarantee information associated with a particular bond. The bond features that may be used to describe a particular bond using the DTD 101 of Appendix B are listed in section 103. The bond features set forth in section 103 may be used to describe a variety of different bond types including, by way of non-limiting example, government, emerging market and corporate bonds.

The DTD 101 of Appendix B includes a section to be used for describing any of the various bond features listed in section 103 including an issue date section 107, a settlement date section 109, an ex-dividend section 111, an accrual section 113, a price section 115, a yield section 117, a periods section 119, a coupons section 121, a capitalization section 123, an amortization section 125, a stepup section 127, a recovery right section 129, an option schedule section 131 and a rolling guarantee section 133.

In addition to the bond attributes listed in section 103, the DTD 101 of Appendix B also may include other bond attributes that are necessary for fully defining the bond attributes. For example, the coupon feature of a bond may require that additional attributes be specified for fully defining the bond’s coupon feature. These additional attributes may include, by way of non-
limiting example, whether the coupons are periodic coupons, detailed coupons or perpetual coupons.

In addition to the bond features included in section 103, in an exemplary embodiment a DTD 101 may be formed including any other attributes that are required to fully describe any other type of bond. Also, any features not impacting any of the analytic calculations may not included in a DTD 101 used to describe the particular bond.

The DTD 101 of Appendix B also includes certain elements that are used to describe a particular bond but that do not relate to the yield performance of the bond. For example, section 105 of the DTD 101 of Appendix B is a bond identification element in which bond attributes such as, by way of non-limiting example, CUSIP number, ISIN number and country class are included to identify the particular bond.

Because the DTD 101 of Appendix B is a comprehensive template for describing the features and attributes of a particular bond in a uniform way, various elements included in the DTD 101 of Appendix B may not be relevant for describing a given bond. Thus, only a portion of the elements included in the DTD 101 of Appendix B may be required to fully describe the attributes of a given bond.

Referring now to Appendix C, there is shown an XML document for describing a particular corporate bond according to the document definition of the DTD 101 of Appendix B. The process of describing the bond using the DTD 101 of Appendix B includes substituting the relevant values for the features that affect the yield of the particular bond and formatting the results into an XML document that conforms to the DTD 101 of Appendix B. For example, the document of Appendix C includes an identification section 203 that indicates that the country class for the particular bond is Brazil, the CUSIP number is tt3163066 and the ISIN number is
XS0049993479. The document of Appendix C also includes a calendar section 205 that defines a holiday center(s); a settlement section 207 that indicates settlement information; an accrual section 209 that defines an accrual periodic; a yield section 211 that defines a yield method and the day count type on which the yield calculation is based; a coupon section 213 that defines the coupon type (e.g., periodic), the first coupon date, the coupon maturity date and the coupon frequency; a capitalization section 215 in which a list of capitalization dates and amount are defined; an amortization section 217 in which a periodic amortization date and an amortization amount is defined; and an option schedule section 219 in which a periodic option schedule is defined as well as the option type, option start date, option strike price, frequency and option termination date.

Accordingly, the XML document of Appendix C may be used to accurately and uniformly define a bond by the attributes that affect the bond’s yield. By conforming to the document definition contained in the DTD 101 of Appendix B, an entity may describe the particular bond and accurately communicate the bond description to other entities that adhere to the document definition of the DTD 101 of Appendix B.

Referring now to FIG. 1, there is shown a block diagram of a system 301 in which bond information is communicated according to the method of the present invention. System 301 includes a client access device 303 (for example a personal computer executing a graphical user interface) that receives bond price quote from a pricing engine 305 that is operated by a financial institution and that receives real-time information and calculates a bond price. In the event the client desires to execute a transaction based on the price quote received, pricing engine 305 forwards a bond trade request to a trading engine 307. Trading engine 307 may communicate with a counterparty 309 in order to complete the trade request requested by the client. Once the
trade is completed, trading engine 311 communicates the transaction details to a settlement system 311 that in turn causes the transaction information to be posted in the financial institution’s books and records 313.

Each device in system 301 includes an XML processor 315 for ensuring that communications between the devices are according to the document definition of the DTD 101 of Appendix B. For example, upon determining a price quote in response to a price request from a client, pricing engine 305 passes the bond price quote details to XML processor 315(5) that then formats the bond information associated with the price quote into an XML document that conforms to the document definition of the DTD 101 of Appendix B. XML processor 315(3) associated with client access device 303 then receives the XML document and presents the bond information to client access device 303 in any format suitable for presentation to the client. Similarly, communications between pricing engine 305 and trading engine 315 is managed by XML processors 315(5) and 315(7), respectively, so that communications conform to the document definition of DTD 101. XML processors 315(11), 315(9) and 315(13) provide a similar function in managing the communication of bond information on behalf of settlement system 311, counterparty 309 and books and records 313, respectively. Thus, because each device in system 301 communicates with any other device according to the uniform document definition of the DTD 101 of Appendix B, the communicating of bond information between devices is accurate and efficient.

In an exemplary embodiment, each device in system 301 communicates natively in XML according to the document definition of the DTD 101 of Appendix B. For example, upon determining a price quote in response to a price request, pricing engine 305 formats the bond information associated with the price quote into an XML document according to the document
definition of the DTD 101 of Appendix B. While system 301 includes certain devices and entities that describe bond attributes and communicate such bond information using an XML syntax according to the document definition of the DTD 101 of Appendix B of the present invention, any other device or entity that desires to describe a bond and communicate such bond information may do so using XML syntax according to the document definition of the DTD 101 of Appendix B.

Although the description above included the use of XML syntax for creating documents to describe the attributes of a bond, it will be obvious based on the above to use any other document formats in a similar way to uniformly and accurately define the characteristics and features of a bond. Also, it will be obvious based on the description above to apply the method of the present invention to financial instruments other than bonds and to other information as well.

Accordingly, the present invention provides a method for describing debt instruments in an accurate and uniform manner. Under the present invention, a document type definition is provided that includes bond attributes and features that affect the yield of bonds and that are therefore necessary for describing the bond. Based on the document type definition, an XML document is formed for a particular bond by inserting the values for the attributes that affect the yield of the bond in the XML document. By describing bond information uniformly using the document type definition of the present invention, bond information can be accurately and efficiently communicated between different entities.

A number of embodiments of the present invention have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the invention. Based on the above description, it will be obvious to one of ordinary skill
to implement the system and methods of the present invention in one or more computer programs that are executable on a programmable system including at least one programmable processor coupled to receive data and instructions from, and to transmit data and instructions to, a data storage system, at least one input device, and at least one output device. Each computer program may be implemented in a high-level procedural or object-oriented programming language, or in assembly or machine language if desired; and in any case, the language may be a compiled or interpreted language. Suitable processors include, by way of example, both general and special purpose microprocessors. Furthermore, alternate embodiments of the invention that implement the system in hardware, firmware or a combination of both hardware and software, as well as distributing modules and/or data in a different fashion will be apparent to those skilled in the art and are also within the scope of the invention. In addition, it will be obvious to one of ordinary skill to use a conventional database management system such as, by way of non-limiting example, Sybase, Oracle and DB2, as a platform for implementing the present invention. Also, network access devices can comprise a personal computer executing an operating system such as Microsoft Windows™, Unix™, or Apple Mac OS™, as well as software applications, such as a JAVA program or a web browser. Network access devices 203-205 can also be a terminal device, a palm-type computer, mobile WEB access device or other device that can adhere to a point-to-point or network communication protocol such as the Internet protocol. Computers and network access devices can include a processor, RAM and/or ROM memory, a display capability, an input device and hard disk or other relatively permanent storage. Accordingly, other embodiments are within the scope of the following claims.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in
carrying out the above process, in a described product, and in the construction set forth without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.
APPENDIX A

Mandatory “ids” element
Identifies the bond. It must be composed of one or more "id" elements:

- Mandatory “id” element
  All non-FFLIB bond analytic functions will refer to a bond via one of its "id" elements: an idClass and idValue. Hence it is composed of the following elements:

  - Mandatory “id_class” element
    Defines the class of the specified id. Typical class would be “cusip”, “isin”, “country-class”, “sometest”...
    Allowed inputs: any string is allowed
    Example: <id_class>ISIN</id_class>

  - Mandatory “id_value” element
    Defines the value of the specified id. For instance, if the id class is “cusip”, a typical id value could be “zz202082” ... if the bond is the Gilt 9.75 2002! Each pair of class and value must be unique to the bond. For instance, across a given id class such as “cusip”, the cusip value of the bond represented by the “id_value” element must be unique among all bonds in the static data.
    Allowed inputs: any string is allowed
    Example: <id_value>AU0000XCLWH5</id_value>

Mandatory “calendar” element
Defines the holiday centre(s). Refer to basic_types.dtd description for more details.

Optional "issue" element
Defines the issue information. It contains the following elements:

- Mandatory "date" element
  Defines the date the bond was issued. Currently this date doesn't intervene in the analytics
  Allowed inputs: any valid date.

- Optional "issuer_name" element
  String describing the bond issuer. This information doesn't intervene in the analytics
  Allowed inputs: any strings is allowed.
  Example: <issuer_name>Accor - Hotels&Motels</issuer_name>

- Optional "issue_price" element
  Defines the price the bond was issued at. It defaults to 100 (as 100% of the face value). It is mainly used for partly-paid bonds and affects the interest payments.
Allowed inputs: a price based on 100 face value.

- **Optional "defaulted" element**
  Specified when the issuer has defaulted on the bond and gives the date it defaulted. This date, combined with any rolling guarantee the bond may have, will affect the bond cashflows.

**Mandatory "settlement" element**
Defines the settlement information. It contains the following elements:

- **Mandatory "date_context" element**
  Defines the number of days needed for settlement to occur given a trade date.
  Allowed inputs: any valid date_context string
  Example:
  ```xml
  <date_context>3bd</date_context>
  ```

- **Optional "lockout_period" element**
  Defines the lockout period as a number of days. The lockout period is the number of business days prior to a coupon date within which the assumed settlement date must be postponed to the next business day on or after the coupon date.
  Allowed inputs: any positive number
  Example:
  ```xml
  <lockout_period>3</lockout_period>
  ```

**Optional "ex_dividend" element**
Optional element that defines how a bond may go ex-dividend. A bond goes ex-dividend when the settlement date lies within a given number of days from the next coupon, in which case the interest is not paid to the buyer. It is composed of:

- **Mandatory "periodic_ex_dividend" element**
  Defines the ex-dividend rule to be the same for all interest payments. It is composed of a "date_context" element that defines the interval between each nominal coupon date and its ex-dividend date.

**Optional "accrual" element**
Optional element that defines accrued interest calculations. One of the following elements must be specified:

- **mandatory "periodic_accrual" element**
  Defines the accrued interest calculation to be the same for all coupon periods. It contains the following elements:

  - **Mandatory "day_count_type" element**
    Specifies the day count type ("Act/Act", "Act/365f"... ) on which the accrued interest is based. Because the accrued interest is based on the interest payment itself, the calculation of irregular interest payments - such as with a irregular
coupon period length - also rely on it. When no "accrual" element is specified, it will default to the yield day count type.

♦ Optional "rounding" element
Allows for rounding of accrued interest. It is based on 100 face value. For instance, if clean price is 100 as 100% of face value and accrued interest is 1.234567, rounding of "3nearest" will result in an accrued interest of 1.235.

♣ Optional "accrual_from" element
Specifies the date at which the bond starts accruing. It will affect both the first interest payment and the accrued interest prior to it. When not specified, it will default to the regular interest accrual date at one coupon period from the first coupon date. The resulting interest accrual date is adjusted according to any date adjustment (default date adjustment is End-Of-Month).

Optional "price" element
Optional element that allows specific formatting of the bond clean price. It is composed of the following:

♣ Optional "price_rounding" element
Allows rounding of the clean price within a specific time range.

♣ Optional "flat_trading" element
Specifies a time range where the bond trades flat (null accrued interest).

Mandatory "yield" element
Mandatory element that specifies the bond yield calculation. This yield is normally the default yield for the bond in Bloomberg. It is composed of the following:

♣ Mandatory "day_count_type" element
Specifies the day count type ("Act/Act", "Act/365f"...) on which the yield calculation is based.

♣ Mandatory "yield_method" element
Specifies the method by which the yield is determined from the price. This yield method may be overridden at the last coupon period(s) by the linear last period yield method.

♣ Mandatory "frequency" element
Specifies the yield compounding.

Optional "linear_last_periods" element
Specifies the last coupon period(s) of the bond within which its yield method is Money Market. The yield frequency defaults to the coupon frequency. It is composed of the following:

♣ Mandatory "day_count_type" element
Defines the day count used for the linear last period yield.
Mandatory "nb_periods" element
Specifies the number of coupon periods the bond uses the linear last period yield before maturing.

Optional "start_on_ex_dividend_date" element
For most bonds, the ex-dividend period immediately prior to the coupon period(s) using the linear last period yield will use the standard yield convention. When this is not the case, "start_on_ex_dividend_date" element can be specified, hence the linear last period starts on the ex-dividend date of the coupon.

Mandatory "defined_by_annualised_rates" element
Interest and principal payments of the bond must be defined by annualized rates. If only the cashflows of a bond are known, one must first find the corresponding annualized rate of each cashflow. It is composed of the following elements:

Optional "capitalisation" element
Specifies any capitalisation the bond may have. Each capitalisation rate specifies an accretion of the outstanding principal. When a capitalisation occurs, part of the coupon goes into capitalisation, and the effective interest payment at the capitalisation date is therefore smaller. It must be composed of one or more of the following pair of "date"-"amount" elements:

- mandatory "date" element
  Date the capitalisation occurred.

- Mandatory "amount" element
  Amount, in percentage based on 100, by which the outstanding principal is accreted.

Mandatory "principal_repayment" element
Defines how the principal is to be paid. It must be defined by either of the following elements:

- "maturity" element
  Defines a bullet principal payment. It is composed of the following elements:
  - Mandatory "date" element
    Maturity date at which the principal is fully repaid.
  - Optional "amount" element
    Redemption amount. It defaults to 100 as 100% of the face value.

- "perpetual" element
  Defines a perpetual bond that never pays back its principal. Perpetual bonds can have periodic or detailed coupons defined. The cashflows shown by Phi will include only the defined ones, but the price-yield relationship will take all cashflows into account and approximate the residual cashflows that are not shown.
"periodic_amortisation" element
Defines a bond that redeems its principal in series of payments of regular dates and constant amount. It includes:

- Mandatory "amortisation" element
  Specifies the first amortisation and includes:
  
  - Mandatory "date" element
    Specifies the date of the first amortisation.
  
  - Mandatory "amount" element
    Specifies the amount of each principal repayment. It is a 100-based percentage of the maximum principal outstanding - i.e. before the amortisation starts .. in other words before any amount is sunk out of the sinking fund.

- Mandatory "maturity" element
  Specifies the maturity date (the optional "amount" element is ignored in that case). Each amortisation occurs at the coupon frequency until maturity.

"detailed_amortisation" element
Defines a bond that redeems its principal in series of payments. It includes one or more of the following "amortisation" element:

- Mandatory "amortisation" element
  Specifies the an amortisation and includes:
  
  - Mandatory "date" element
    Specifies the date of the amortisation.
  
  - Mandatory "amount" element
    Specifies the amount of the amortisation. It is a 100-based percentage of the maximum principal outstanding - i.e. before the amortisation starts, in other words before any amount is sunk.

"perpetual_amortisation" element
Specifies an evergreen bond. Such bonds repay their principal as a percentage of the principal outstanding (as opposed to the maximum principal outstanding). Hence the principal repayments may never end. They also may start amortising after settlement. It is composed of the following elements:

- Mandatory "date" element
  Defines the start date of the amortisation
• **Mandatory "repayment_rate" element**
  Specifies the amount of each principal repayment. It is a 100-based percentage of the current principal outstanding.

• **Mandatory end of amortisation**
  One of the following elements must be set in order to specify the end of the amortisation:
  - **"repayment_min_threshold" element**
    Defines the minimum principal outstanding, in 100-based percentage of the face value, under which amortisation ends
  - **"repayment_max_cashflows" element**
    Defines the maximum number of principal repayments
  - **"repayment_termination_date" element**
    Defines the date at which the amortisation ends

• **Mandatory "frequency" element**
  Defines the frequency at which the amortisation occur

• **Optional "amortisation_begins_on_settlement" element.**
  When it is set, the first amortisation date starts on or after the settlement date

• **Optional "consolidated_last_cashflow" element**
  Makes the last amortisation amount equal to the full principal outstanding left to be paid. Thus the sum of all amortisation amounts is equal to the maximum principal outstanding.

☐ **Optional "coupon_rates" element**
  Defines the interest payments. Note that all coupon rates are nominal: they don't include capitalisation, amortisation and step-up. It is composed of the following elements:

  • **Mandatory set of periodic or detailed coupons**
    Either of the following elements must be set:
    - **"periodic_coupons" element**
      Defines a series of interest payments that occur at regular intervals and constant nominal rate. Please note that regular coupon dates are ones that follow the coupon frequency AND the date adjustment, so they don't have to follow regular calendar intervals. The following elements are included:
- **Mandatory "first_coupon" element**
  Defines the date of the first coupon. This date must correspond to the maturity date with regards to the coupon frequency.

- **Optional "last_regular_coupon" element**
  Defines the date of the last regular coupon. When the last coupon period is irregular – i.e. doesn’t correspond to the coupon date with regards to the first coupon frequency – the last regular coupon date must be provided. This date must in sync with the first coupon date with regards to the coupon frequency. It also must be before the maturity date.

- **Mandatory coupon value:**
  Either of the 2 following elements must be defined:
  
  - **"amount" element**
    Specifies the amount of the interest payment. It is a 100-based percentage of the face value, but doesn’t include amortisation, capitalisation and step-up – i.e. it’s nominal interest.
  
  - **"margin" element**
    For floating rate notes only. Specifies the margin added to the coupon amount. It is a number of basis points of the face value, but doesn’t include amortisation, capitalisation and step-up.

- **Optional "step_up" element**
  Defines the coupon step-up(s). A step-up is an increase in interest payment. A bond can have many step-ups. This element must be composed of one or more of the following pair of “date”-“amount” elements:
  
  - **Mandatory "date" element**
    Specifies the step-up date at which the new rate is applied. It can be any date from the first coupon date to the maturity date. Step-up dates can lie between coupon dates.
  
  - **Mandatory "amount" element**
    Specifies the amount by which the interest payment is increased. A negative amount will specify an interest decrease. It is a 100-based percentage of the face value, but doesn’t include amortisation and capitalisation – i.e. it’s based on nominal interest. For instance a nominal interest payment going from 4% to 5% would correspond to a step-up amount of 1.

- **Optional "date_adjustment" element**
  Defines any coupon date adjustment. Defaults to “EOM” for End-Of-Month. All coupon and amortisation dates provided in the XML
should be adjusted with regards to this element. Coupon and amortisation dates generated by Phi (periodic coupons and/or amortisation...) will use this element to find the regular nominal dates.

- **Optional "cap" element**
  For floating rate notes only. Specifies the highest interest payment the bond will pay. It is a 100-based percentage of the face value, but doesn’t include amortisation and capitalisation – i.e. it’s based on nominal interest.

- **Optional "floor" element**
  For floating rate notes only. Specifies the lowest interest payment the bond will pay. It is a 100-based percentage of the face value, but doesn’t include amortisation and capitalisation – i.e. it’s based on nominal interest.

- **Optional "relative_date_adjustment" element**
  For floating rate notes only. Defines coupon dates that are adjusted relative to the current next coupon date. Thus the date adjustment is also relative to the settlement date. It is composed of the following elements:
    - **Mandatory “from” element**
      Defines how the next coupon date is adjusted. It can be adjusted to the next business day or based on the business-day adjustments of the previous coupons. All the following coupon dates are based on the resultant adjusted next coupon date and the coupon frequency.
    - **Optional “always” element**
      Defines the current coupon date to be adjusted to an additional calendar day.

- **"detailed_coupons" element**
  Defines a set of coupons that are irregular in date and/or amount. Note that when only the interest payments vary, it is much easier to specify a "periodic_coupons" element with step-ups. One or more “coupon” elements must be specified:
    - **Mandatory “coupon” element**
      Specifies a single coupon and includes the following elements:
        - **Mandatory coupon value:**
          Either of the 2 following elements must be defined:
- "amount" element
  Specifies the amount of the interest payment. It is a 100-based percentage of the face value, but doesn’t include amortisation and capitalisation – i.e. it’s nominal interest.

- "margin" element
  For floating rate notes only. Specifies the margin added to the coupon amount. It is a number of basis points of the face value, but doesn’t include amortisation and capitalisation.

- Optional "cap" element
  For floating rate notes only. Specifies the highest interest payment the bond will pay. It is a 100-based percentage of the face value, but doesn’t include amortisation and capitalisation – i.e. it’s based on nominal interest.

- Optional "floor" element
  For floating rate notes only. Specifies the lowest interest payment the bond will pay. It is a 100-based percentage of the face value, but doesn’t include amortisation and capitalisation – i.e. it’s based on nominal interest.

♦ Mandatory "frequency" element
  Defines the frequency at which the interest payments occur. Even

♦ Optional "index" element
  Defines the index used to generate the interest payments. It is only a description field and is not used for analytics.

♦ Optional "frn_data" element
  Used for floating rate notes. It is composed of the following elements:
  
  • Mandatory “refix_frequency” element
    Contains a mandatory “frequency” element that specifies the refix frequency for the note.

  • Mandatory “reset_days” element
    Contains a mandatory “date_context” element that specifies the time interval from the next coupon at which the coupon can be fixed.

  • Optional “leverage” element
    Contains a mandatory “amount” element that specifies the leverage to apply on each coupon. It defaults to 1.

♦ Optional "ilb_data" element
  Used for index-linked bonds
• Mandatory "ilb_method" element
• Mandatory "day_count_type" element
• Mandatory "index_value_at_issue" element
• Optional "principal_is_index_linked" element
• Optional "coupons_are_index_linked" element
• Optional "principal_is_current_pay" element
• Optional "coupons_are_current_pay" element
• Optional "coupons_are_capitalised_and_paid_at_maturity" element

♦ Optional "amount_adjustment" element
Specifications the amount adjustment that the coupon amounts are subject to.

☐ Optional "partly_paid_schedule" element
Defines a series of principal part-payments to the issuer, as opposed to full payment at issue date. Note that the issue price defaults to 100 face value. It is likely that partly-paid bonds have a specific issue price less than 100. In which case an issue price should be specified (see "issue" element). It is composed of one or more part-payments. The following pair of "date"-"amount" elements, represents each part-payment:

♦ Mandatory "date" element
Defines the part-payment nominal date

♦ Mandatory "amount" element
Amount is in 100-based percentage of the face value.

Optional "option_schedule" element
Defined callable and/or puttable bonds. It is composed of the following elements:

☐ Mandatory set of periodic or detailed options:
Either of the following elements must be set:

♦ "periodic_option_schedule" element
Defines a series of either Call or Put options whose exercise dates occur at regular intervals, and whose strike is the constant. The End-Of-Month date adjustment is used. It is composed of the following elements:

• Mandatory "exercise" element
Specifies the first exercise. It is composed of:

  • Mandatory "option_style" element
Either "call" or "put", and also defines the type of all subsequent options.
Mandatory "start" element
Start date of the first option.

Optional "end" element
Defined for American options only. It defines the last date at which the first option can be exercised.

Mandatory "strike" element
Amount - in 100-based percentage of the face value - at which the bond is paid back. It doesn't include the interest accrued from the last coupon payment (the so-called "dirty strike" includes both the final interest and the principal payments).

Optional "frequency" element
Defines the regular intervals between options. It is used for both the start date and end date of the option. The frequency defaults to the coupon frequency.

Optional "termination_date" element
Defines the end date of the option schedule. All options start dates lie on or before the termination date. The termination date defaults to the maturity date of the bond.

"detailed_option_schedule" element
Defines a set of Call and/or Put options. It must be composed of one or more "exercise" elements:

"exercise" element
Specifies a single option. It is composed of the following elements:

Mandatory "option_style" element
Either "call" or "put".

Mandatory "start" element
Start date of the option.

Optional "end" element
Defined for American options only. It defines the last date at which the option can be exercised.

Mandatory "strike" element
Amount - in 100-based percentage of the face value - at which the bond is paid back. It doesn't include the interest accrued from the last coupon payment (the so-called "dirty strike" includes both the final interest and the principal payments).
Optional "notice_days" element
Specifications the number of days from the trade date to the option exercise date below which the option cannot be exercised. If a bond has been called or put, the XML definition for the bond should be updated to reflect the new maturity of the bond.

"rolling_guarantee" element
Optional element that defines the rolling guarantee for the bond. It will affect stripped analytic measures, and also the bond cashflow if the bond defaults. It is composed of the following elements:

Optional "start" element
Defines the start of the rolling guarantee. It defaults to the issue date of the bond or the interest accrual date if the former is not specified.

Optional "end" element
Defines the end of the rolling guarantee. It defaults to the maturity date. Any cashflows after that date is not affected by the rolling guarantee.

Mandatory "nb_periods" element
Defines the number of guaranteed cashflows. Unless the bond has defaulted, guaranteed cashflows: - are on or after both the settlement date and the start of the rolling guarantee; - are on or before the end of the rolling guarantee; - are only in number of "nb_periods".

Optional "principal_guaranteed" element
Sets the principal to be guaranteed.

Mandatory "index" element
Defines the guarantor curve used to discount the guaranteed interest payments. The principal is discounted using a separate discount rate. This element is only a description field and is not used for analytics.
APPENDIX B

<!-- XML Document Type Definition for govt, emerging market and corporate bonds -- 101>
<!-- Fixed Income Analytics, -->

<!ENTITY % basic_types PUBLIC "" "basic_types.dtd">
%basic_types;

<!-- Bond Elements -->

<!ELEMENT bond (id+, calendar, issue?, settlement, ex_dividend?, accrual, price?, yield, linear_last_periods?,
coupons, capitalisation?, amortisation?, stepup?, value_recovery_right?, option_schedule?,
rolling_guarantee?)>

<!ELEMENT id (id_class, id_value)>
<!-- id class: "CUSIP", "ISIN", "COUNTRY-CLASS".. -->
<!ELEMENT id_class (#PCDATA)>
<!ELEMENT id_value (#PCDATA)>
<!-- issue date must be specified if when_if_months defines cashflow dates -->
<!ELEMENT issue (date)>

<!ELEMENT settlement (date_context, lockout_period?)>

<!ELEMENT ex_dividend (periodic_ex_dividend|detailed_ex_dividend)>
<!ELEMENT periodic_ex_dividend (date_context)>
<!-- date specifies start date of date context -->
<!ELEMENT detailed_ex_dividend (date, date_context)>

<!ELEMENT accrual ((periodic_accrual|detailed_accrual), accrual_from?)>
<!ELEMENT periodic_accrual (day_count_type, rounding?)>
<!-- date specifies start date of day count type -->
<!ELEMENT detailed_accrual (date, day_count_type, rounding?)>
<!ELEMENT accrual_from (date)>

<!ELEMENT price (price_rounding?, flat_trading?)>
<!ELEMENT price_rounding (rounding_range, rounding)>
<!-- rounding range: "all", "llp" when applied only in linear periods, "nollp" -->
<!ELEMENT rounding_range (#PCDATA)>
<!-- flat_trading: "all", "exdiv" -->
<!ELEMENT flat_trading (#PCDATA)>

<!ELEMENT yield (day_count_type, yield_method, frequency?)>
<!ELEMENT yield_method (#PCDATA)>
<!-- yield frequency defaults to coupon frequency -->

<!ELEMENT linear_last_periods (day_count_type, nb_periods, start_on_ex_dividend, date?)>
<!ELEMENT nb_periods (#PCDATA)>
<!ELEMENT start_on_ex_dividend_date EMPTY>

<!ELEMENT coupons (periodic_coupons|detailed_coupons|perpetual_coupons), frequency, index?)>
<!ELEMENT periodic_coupons (first_coupon, last_regular_coupon?, maturity, (amount|margin),
date_adjustment?, amount_adjustment?, cap?, floor?)>
<!-- amount = redemption: defaults to 100, not compatible with amortisation -->
<!ELEMENT yield_method (#PCDATA)>
<!ELEMENT when_if_months (#PCDATA)>
<!ELEMENT margin (#PCDATA)>
<!-- date adjustment: "none", "com" when end of month convention, "busday", "busdaymth" when next business day in month -->
<!-- defaults to "com" -->
<!ELEMENT date_adjustment (#PCDATA)>
<!-- amount adjustment: if specified, uses the accrual day count type -->
<!-- if not specified, uses coupon frequency to interpret annualized coupon amount -->

<!ELEMENT amount_adjustment EMPTY>
<!ELEMENT first_coupon (date)>  
<!ELEMENT last_regular_coupon (date)>  
<!ELEMENT cap (amount)>  
<!ELEMENT floor (amount)>  
<!ELEMENT detailed_coupons (date | when if months), (amount | margin), amount_adjustment?, cap?, floor?)[>  
<!ELEMENT perpetual_coupons (first_coupon, amount)>  
<!-- index is used when a margin is present in coupons: i.e. "LIBOR", "RPI" -->  
<!ELEMENT index (index_id, nb_reset_days)>  
<!ELEMENT index_id (#PCDATA)>  
<!ELEMENT nb_reset_days (#PCDATA)>  
<!-- capitalisation: amount in annualized % of face value -->  
<!ELEMENT capitalisation (date | when if months), amount)[>  
<!-- amortisation: amount in % of sinking fund -->  
<!ELEMENT amortisation (periodic_amortisation | detailed_amortisation | bullet_amortisation)[>  
<!-- date specifies start date of amortisation, end date is maturity -->  
<!ELEMENT periodic_amortisation (date | when if months), amount)[>  
<!ELEMENT detailed_amortisation (date | when if months), amount)[>  
<!-- bullet amortisation: amount defaults to 100% of sinking fund -->  
<!ELEMENT bullet_amortisation (amount)[>  
<!-- stepup: coupon variation in annualized % of face value, doesn't include capitalisation -->  
<!ELEMENT stepup (date | when if months), amount)[>  
<!ELEMENT value_recovery_right (index, (date, amount))[>  
<!ELEMENT option_schedule (periodic_option_schedule | detailed_option_schedule), date_context?!)[>  
<!-- periodic option defaults: frequency -->  
<!ELEMENT periodic_option_schedule (exercise, frequency, termination_date) | maturity date -->  
<!ELEMENT termination_date (date)>  
<!-- periodic option defaults: frequency -->  
<!ELEMENT detailed_option_schedule (exercise) | maturity date -->  
<!ELEMENT exercise (option_style, start, end?, strike) | maturity date -->  
<!ELEMENT option_style (#PCDATA)>  
<!ELEMENT start (date)>  
<!ELEMENT end (date)>  
<!-- strike price based on 100 face value -->  
<!ELEMENT strike (amount)>  
<!-- rolling guarantee: start defaults to issue date, end defaults to maturity, index specifies guarantor curve -->  
<!ELEMENT rolling guarantee (start?, end?, nb_periods, principal_guaranteed?, index)>  
<!ELEMENT principal_guaranteed EMPTY>
APPENDIX C

```xml
<?xml version = "1.0"?>
<!DOCTYPE bond SYSTEM "cpx_bond.dtd">

<bond>
  <id>
    <id_class>COUNTRY-CLASS</id_class><id_value>brazil-c</id_value>
    <id_class>CUSIP</id_class><id_value>031635066</id_value>
    <id_class>ISIN</id_class><id_value>XS0049993479</id_value>
  </id>
  <calendar>ton#nyk</calendar>
  <settlement><date_context>3bd</date_context></settlement>
  <accrual>
    <periodic_accrual>
      <day_count_type>30e/360</day_count_type>
    </periodic_accrual>
    <yield>
      <day_count_type>30e/360</day_count_type>
      <yield_method>ISMA</yield_method>
    </yield>
  </accrual>
  <coupons>
    <periodic_coupons>
      <first_coupon>
        <date><day>15</day><month>10</month><year>1994</year></date>
        <maturity>
          <date><day>15</day><month>4</month><year>2014</year></date>
        </maturity>
        <amount>8</amount>
      </first_coupon>
    </periodic_coupons>
    <frequency>
      <integer>6</integer>
    </frequency>
  </coupons>
  <capitalisation>
    <amount>4.0</amount>
    <date><day>15</day><month>10</month><year>1994</year></date>
    <amount>4.0</amount>
    <date><day>15</day><month>4</month><year>1995</year></date>
    <amount>4.0</amount>
    <date><day>15</day><month>10</month><year>1995</year></date>
    <amount>4.0</amount>
    <date><day>15</day><month>4</month><year>1996</year></date>
    <amount>4.0</amount>
    <date><day>15</day><month>10</month><year>1996</year></date>
    <amount>3.5</amount>
    <date><day>15</day><month>4</month><year>1997</year></date>
    <amount>3.5</amount>
    <date><day>15</day><month>10</month><year>1997</year></date>
    <amount>3.5</amount>
  </capitalisation>
</bond>
```
CLAIMS

1. A method for communicating a description of a bond between a first entity and a second entity, comprising the steps of:
   selecting at least some attributes that are associated with the bond from a plurality of bond attributes;
   choosing a value for each of said at least some attributes;
   creating said description of said bond by formatting said values for said at least some attributes according to a document type definition; and
   communicating said description of said bond between said first entity and said second entity.

2. The method of claim 1, wherein said bond attributes include the maturity and redemption.

3. The method of claim 2, wherein said bond attributes includes at least one attribute selected from the group including a coupon type, a settlement date, an ex-dividend date, an accrual type, an amortization rate, a capitalization date, a tax status and a recovery right.

4. The method of claim 1, wherein said bond has a yield and at least some of said at least some attributes relate to said yield of said bond.

5. The method of claim 1, wherein at least some of said at least some of said attributes identify said bond.

6. The method of claim 1, wherein said document type definition conforms to an Extensible Markup Language syntax.

7. The method of claim 1, wherein said bond is a corporate bond.

8. The method of claim 1, wherein said bond is a government bond.
9. The method of claim 1, wherein said bond is an emerging market bond.

10. A method for forming a description of a bond, comprising the steps of:

   selecting at least some attributes that are associated with the bond from a plurality of bond attributes;
   choosing a value for each of said at least some attributes; and
   creating said description of said bond by formatting said values for said at least some attributes according to a document type definition.

11. The method of claim 10, further comprising a first entity and a second entity and wherein the method further comprises the step of:

   communicating said description of said bond between said first entity and said second entity.

12. The method of claim 10, wherein said bond attributes include the maturity, redemption, credit quality, interest rate and price.

13. The method of claim 12, wherein said bond attributes includes at least one attribute selected from the group including a coupon type, a settlement date, an ex-dividend date, an accrual type, an amortization rate, a capitalization date, a tax status and a recovery right.

14. The method of claim 10, wherein said bond has a yield and at least some of said at least some attributes relate to said yield of said bond.

15. The method of claim 10, wherein at least some of said at least some of said attributes identify said bond.

16. The method of claim 10, wherein said document type definition conforms to an Extensible Markup Language syntax.

17. The method of claim 10, wherein said bond is a corporate bond.
18. The method of claim 10, wherein said bond is a government bond.

19. The method of claim 10, wherein said bond is an emerging market bond.

20. A system for communicating a description of a bond, comprising:

   a first entity, said first entity selecting at least some attributes that are associated with the bond from a plurality of bond attributes, said first entity choosing a value for each of said at least some attributes and said first entity creating said description of said bond by formatting said values for said at least some attributes according to a document type definition; and

   a second entity in communications with said first entity;

   wherein when said first entity communicates said description of said bond to said second entity, said second entity interprets said description according to said document type definition.

21. The system of claim 20, wherein said bond attributes include the maturity and redemption.

22. The system of claim 21, wherein said bond attributes includes at least one attribute selected from the group including a coupon type, a settlement date, an ex-dividend date, an accrual type, an amortization rate, a capitalization date, a tax status and a recovery right.

23. The system of claim 20, wherein said bond has a yield and at least some of said at least some attributes relate to said yield of said bond.

24. The system of claim 20, wherein at least some of said at least some of said attributes identify said bond.

25. The system of claim 20, wherein said document type definition conforms to an Extensible Markup Language syntax.

26. The system of claim 20, wherein said bond is a corporate bond.

27. The system of claim 20, wherein said bond is a government bond.
28. The system of claim 20, wherein said bond is an emerging market bond.

29. The system of claim 20, wherein said first entity includes an XML processor for formatting said values for said at least some attributes according to a document type definition.

30. The system of claim 20, wherein said second entity includes an XML processor for interpreting said description according to said document type definition.
FIG. 1