XML SPECIFICATION FOR ELECTRONIC INVOICES[*]

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In this paper we are proposing an XML specification for electronic invoices. It is based on the current IT and Internet technologies and reflects the European directives and Bulgarian legislation concerning invoicing. We are proposing a structure of an electronic invoice as an XML document by describing the major elements and sub elements.

1. Introduction. Electronic invoicing is today's hot topic across the nations. Electronic invoicing automates the invoicing process. In electronic invoicing the data has to be entered fewer times than in the traditional invoicing resulting in fewer typing errors. Also electronic invoicing results in space savings because of the electronic archiving used in applications. When changing to electronic invoicing from the paper invoices, companies save time and money up to 80–90%.

An invoice can be described as the proof of payment in a transaction involving the sale of goods, provision of labor service, or other business activities. An invoice is also a document supporting that a payment and receipt has taken place, an official document for financial management and accounting, and important tool in auditing for taxation purpose [1].

Electronic invoice is often referred to as an e-invoice. The most obvious way an electronic invoice differs from the traditional invoice is that it has an electronic form. Another difference is the technology used with electronic invoicing. The integrity of data and authenticity of the origin are main security issues related to electronic invoicing. The content of an electronic invoice has various message formats.

One major problem with electronic invoicing is that currently there is no international standard.

In this paper we are proposing an XML specification for electronic invoices. It is based on the current IT and Internet technologies and reflects European directives and Bulgarian legislation concerning invoicing. This could be a step towards standardization of electronic invoicing in Bulgaria and can contribute to the development and growth of electronic business in this country.

2. Invoicing in Bulgaria after Joining the European Union. As Bulgaria joins the European Union (EU) from the beginning of 2007, a number of changes to Bulgarian laws and regulations concerning invoicing have been made in order to harmonize our

legislation with the European Directives. The changes mainly reflect the inner community trade of goods and services between parties from different EU countries (no more considered as import/export) and the corresponding treatment and payment of Value Added Tax (VAT).

The Council Directive 2001/115/EC – in force from 1 January 2004 in existing EU Member States and in Bulgaria from 1 January 2007 – harmonises, simplifies and modernises invoicing obligations on traders when they sell goods or services that are subject to VAT. It also creates an EU legal framework for electronic transmission and storage of invoices.

This means that a trader in the EU will now only have to comply with one set of rules for all the invoices he issues, irrespective of where the goods or services he is supplying are taxable. Any invoice complying with these rules will be acceptable for VAT purposes throughout the EU by all tax administrations.

The Directive provides for:

- A list of mandatory items that must be mentioned on each invoice (date of issue, invoice number, name and address of selling trader and customer, description of goods or services, VAT rate applicable and VAT amount payable).
- Simplification schemes for certain categories of traders (such as small traders) and certain invoices (such as where the amounts involved are small).
- The option to issue electronic instead of paper invoices which will be valid for claiming VAT deductions.
- The freedom to choose the place and method of storage of invoices. For example, the Directive makes it possible for a trader to store invoices online in a Member State other than the Member State in which he is established.
- The possibility for a trader to outsource invoicing operations to a third party or to his customer (i.e. self-billing).

3. Electronic invoicing technologies. In the past, large companies have connected their major supplier through private networks often referred to as electronic data interchanges (EDI) resulting in time and costs savings [2]. In the 1970's work began for EDI standards. EDI was widely spread in the late 1970s to mid-1980s [3]. EDI is an electronic transmission of documents between businesses. EDI uses a set of standard forms, messages, and data elements, and it is based on pre-existing contractual relations. With EDI the documents are exchanged through point-to-point connections, private networks, value-added networks, and the Internet [4].

The development of eXtensible Markup Language (XML) began in 1996 and in 1998 it became a World Wide Web Consortium (W3C) recommendation [5]. XML is designed to be served, received, and processed on the web in the way that is currently possible with Hypertext Markup Language (HTML). XML differs from both Standardized General Markup Language (SGML) and HTML in that easy to implementation and compatibility [6].

ebXML is a joint project of the United Nations body for Trade Facilitation and Electronic Business, and OASIS, the Organization for the Advancement of Structured Information Standards to develop a framework for using XML to exchange business data [7]. ebXML stands for Electronic Business eXtensible Markup Language. It is an open XML-based infrastructure enabling businesses to exchange messages, conduct trading

relationships, communicate data in common terms and define and register business processes [8].

Visa International has introduced a new specification that will dramatically increase a corporation's ability to automate business-to-business (B2B) purchasing functions and monitor travel and entertainment (T&E) expenses worldwide – both on the Internet and in the physical world. The new Visa Global Invoice Specification [9] uses Extensible Markup Language (XML) to exchange invoice and payment data across industries and technical processing platforms.

4. Our approach. Our approach to electronic invoicing is based on XML. In the next section we are proposing a structure of an electronic invoice as an XML document by describing the major elements and subelements according to our vision. We have investigated the European directives and Bulgarian laws and legal regulations concerning invoicing. We have also reviewed various software products and paper invoices in order to make the XML invoice specification as general as possible.

5. Structure of a XML invoice document. The root element of the XML invoice document is the **Invoice** element. Below the root element, there are three top-level sections: **InvoiceHeader**, **InvoiceDetails**, and **InvoiceSummary**.

InvoiceHeader contains subelements that hold all the data associated with the invoice as a whole that is not classed as summary information.

InvoiceDetails contain subelements that hold all the invoice line-level data. There is one instance of **InvoiceDetails** for each invoice line.

InvoiceSummary contains subelements that hold all the invoice summary details.

The following example shows the main structure of the XML invoice document:

```
<?xml version="1.0" encoding="utf-8"?>
<Invoice>}
    <InvoiceHeader>
    : :
    </InvoiceHeader>
    <InvoiceDetails>
    : :
    </InvoiceDetails>
    <InvoiceSummary>
    : :
    </InvoiceSummary>
</Invoice>
```

Below we will discuss in brief the three top level elements of the XML invoice document. **InvoiceHeader** element contains sub elements that hold all the data associated with the invoice as a whole.

InvoiceType – indicates the type of invoice, such as whether the invoice document is an invoice, a debit note or a credit note.

InvoiceNumber – holds the invoice number.

InvoiceDate – holds the invoice date.

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VATTreatment – indicates the tax (VAT) treatment, such as whether gross or net pricing is used, and whether tax is calculated at line or invoice level, or no tax is applied.

Currency – holds a coded currency identifier. The currency value applies to the whole invoice. If omitted, the default currency of the invoice is BGN (Bulgarian lev).

Location – holds information about the place where the invoice is issued.

PaymentType – indicates the payment method, such as cash or bank transfer.

ReferencedDocument – this element is used only when the **InvoiceType** is debit note or credit note. It holds the number and date of the referenced invoice document.

ReceiveDate – holds the date of receiving of the goods/services enlisted in the invoice

Party – this container element holds name, address and other details of parties associated with the invoice. The **InvoiceHeader** contains two party elements – one for the buyer and one for the supplier. The sub elements of the party are described later.

The following example shows the structure of the invoice header:

```
<InvoiceHeader>
      <InvoiceType>Invoice</InvoiceType>
      <InvoiceNumber>1234567890</InvoiceNumber>
      <InvoiceDate>2006-11-10</InvoiceDate>
      <VATTreatment>GIL</VATTreatment>
      <Currency>BGN</Currency>
      <Location>Sofia</Location>
      <PaymentType>Cash</PaymentType>
      <ReceiveDate>2006-11-10</ReceiveDate>
      <Party Role="Buyer">
            <Name>XYZ Company Ltd.</Name>
            <Address>
                  <ZIP>1000</ZIP>
                  <City>Sofia</City>
                  <Street>Gurko,15</Street>
            </Address>
            <IdNumber>1020293851</IdNumber>
            <VATNumber>BG1020293851</VATNumber>
            : :
      </Party>
      <Party Role="Supplier">
            <Name> ABV Company OOD</Name>
            : :
      </Party Role="Supplier">
</InvoiceHeader>
```

InvoiceDetails contains one or more **InvoiceItems** elements that hold all information about the goods/services enlisted in the invoice.

InvoiceItem contains line-level information and has the following most important sub items:

      LineItemNum – contains the current line number.
      ItemCode – contains the product identification code.
      ItemName – contains the name of the article/service.
      Quantity – a decimal number representing the actual invoiced quantity.
      UnitOfMeasure – holds the unit of measure (for example, ea, kg, m etc.).
      UnitPrice – holds the line item unit price.
      LineItemSubtotal – holds the subtotal value for this line item.
    The following example shows the structure of the invoice details:

```
<InvoiceDetails>
     <InvoiceItem>
          <LineItemNum>1</LineItemNum>
          <ItemCode>34567</ItemCode>
          <ItemName>Monitor</ItemName>
          <Quantity>5</Quantity>
          <UnitOfMeasure>ea</UnitOfMeasure>
          <UnitPrice>365</UnitPrice>
          <LineItemSubtotal>1825</LineItemSubtotal>
     </InvoiceItem>
     <InvoiceItem>
          <LineItemNum>2</LineItemNum>
          <ItemCode>31798</ItemCode>
          <ItemName>Printer</ItemName>
          <Quantity>1</Quantity>
          <UnitOfMeasure>ea</UnitOfMeasure>
          <UnitPrice>320</UnitPrice>
          <LineItemSubtotal>320</LineItemSubtotal>
     </InvoiceItem>
</InvoiceDetails>
```

    InvoiceSummary – this container element contains subelements that hold all the invoice summary details.

      VATPercent – contains a number representing the VAT rate as a percentage. It is used only when the invoice tax is applied on invoice level (see **VATTreatment**).
      NetValue – holds the total net value of the invoice.
      VATValue – holds the total calculated tax value of the invoice.
      GrossValue – holds the total gross value of the invoice.
    The following example shows the structure of the invoice summary:

```
<InvoiceSummary>
     <VATPercent>20</VATPercent>
     <NetValue>2145</NetValue>
     <VATValue>429</VATValue>
     <GrossValue>2574</GrossValue>
<\InvoiceSummary>
```

Other Elements

Party – contains information about the parties associated with the invoice. It has an attribute **Role** with value **Buyer** or **Supplier** indicating the role of the corresponding party. It has the following main sub elements:

> **Name** – contains the full name of the party.
>
> **Address** – this container element contains the postal information about the party.
>
> **IdNumber** – holds the party's company registration number.
>
> **VATNumber** – holds the party's company VAT registration number.
>
> **Person** – this container element contains information about the person and his role associated with the invoice. The party element usually contains two or more **Person** subelements.
>
> **BankAccount** –container element with bank account information of the party. This element can occur 0, 1, 2 or more times in the **Party** element.

Person – a container element with information about the person and his role associated with the invoice. It mainly includes the following subelements: **Name**, **Address**, **E-mail**, **Phone**.

BankAccount – a container element with bank account information of the person such as **BankName, IBAN** and **BIC**.

Address – a container element with postal information such as **ZIP**, **City**, **Street**, **State** and **Country**.

6. Conclusion. The proposed XML specification is the first step towards the use of electronic invoices. We are also developing an XML Schema [10] that describes formally the structure of the XML invoice document. This schema will be published in Internet and can be used for automatic software verification of electronic XML invoices. This will encourage other software developers and companies to create products for electronic invoices or to easily extend existing accounting or ERP products with import/export functions for e-invoice.

We are developing an XML Invoice Viewer – a software product that will be distributed free of charge. The viewer allows electronic XML invoices to be viewed on screen or printed as if they are ordinary (paper) invoices.

Another important aspect of using XML for electronic invoices is that XML documents can be digitally signed using XML Signature – a W3C recommendation that defines an XML syntax for digital signatures [11]. According to current Bulgarian legal regulations, an electronic document signed with a valid Universal Electronic Signature is a legal valid document and can be used or accepted anywhere in Bulgaria. So that, we are extending our XML Invoice Viewer with functionalities for processing digitally signed XML invoices.

Since our approach is also synchronized with European Union Council Directives about processing of electronic documents, we hope that the proposed XML specification will contribute to the further development of e-commerce and e-government services in Bulgaria.

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XML СПЕЦИФИКАЦИЯ ЗА ЕЛЕКТРОННИ ФАКТУРИ

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В тази статия ние предлагаме XML спецификация за електронни фактури. Тя се основава на съвременните информационни и Интернет технологии и отразява Европейските директиви и българското законодателство относно фактурирането. Ние предлагаме структура на електронна фактура като XML документ, като описваме главните ѝ елементи и поделементи.