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Electronic Commerce Modeling Language (ECML)
Version 2 Specification

Status of This Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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Abstract

Electronic commerce frequently requires a substantial exchange of information in order to complete a purchase or other transaction, especially the first time the parties communicate. A standard set of hierarchically-organized payment-related information field names in an XML syntax is defined so that this task can be more easily automated. This is the second version of an Electronic Commerce Modeling Language (ECML) and is intended to meet the requirements of RFC 3505.

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1. Introduction

Numerous parties are conducting business on the Internet using ad hoc fields and forms. The data formats and structure can vary considerably from one party to another. Where forms are filled out manually, some users find the diversity confusing, and the process of manually filling in these forms can be tedious and error prone.

Software tools, including electronic wallets, can help this situation. Such tools can assist in conducting online transactions by storing billing, shipping, payment, preference, and similar information and using this information to complete the data sets required by interactions automatically. For example, software that fills out forms has been successfully built into browsers, as proxy servers, as helper applications to browsers, as stand-alone applications, as browser plug-ins, and as server-based applications. But the proliferation of more automated transaction software has been hampered by the lack of standards.

ECML (Electronic Commerce Modeling Language) provides a set of hierarchical payment-oriented data structures that will enable automated software, including electronic wallets from multiple vendors, to supply and query for needed data in a more uniform manner.

Version 2.0 extends ECML Versions 1.0 [RFC2706] and 1.1 [RFC3106] as described in the appendix to this document. These enhancements include support for additional payment mechanisms and transaction information and use of XML as the exemplar syntax.

ECML is designed to provide a simple baseline useful in a variety of contexts. Likely uses for ECML v2 are consumer payment information input and business-to-business transactions. At this time, the first is still likely to occur through HTML forms. The second is more likely to use XML documents.

1.2. History and Relationship to Other Standards

The ECML fields were initially derived from the W3C P3P base data schema [P3P.BASE] by the ECML Alliance as described in [RFC2706, RFC3106]. Technical development and change control of ECML was then transferred to the IETF. In version 2, ECML is extended by the fields in a W3C P3P Note related to eCommerce [P3P.ECOM], by [ISO8583], and other sources. Its primary exemplar form is now an XML syntax.

2. Field Definitions, DTD, and Schema

ECML v2 is the definition and naming of a hierarchically structured set of fields and the provision of an optional XML syntax for their transmission. These fields can be encoded in other syntaxes. Regardless of the encoding used, the fields can be transmitted via a variety of protocols.

Section 2.1 below lists and describes the fields, Section 2.2.1 provides an XML DTD for use with the fields, and Section 2.2.2 provides an XML schema.

To conform to this document, field names must be named and hierarchically structured as closely to the structure and naming listed below as is practical given the syntax and transaction protocol in use. (NOTE: This does not impose any restriction on human visible labeling of fields, just on their name or names and structure as used in on-the-wire communication.)

2.1. Field List and Descriptions

The fields are listed below, along with the minimum data entry size allowed. Implementations may accept larger data sizes, if doing so makes sense, and, for some applications, they will need to allow for larger data sizes.

Note that these fields are hierarchically organized as indicated in this table by the embedded underscore ("_") characters. Appropriate data transmission mechanisms may use this to request and send aggregates, such as Ecom_Payment_Card_ExpDate (to encompass all of a set of card expiry date components) or Ecom_ShipTo (to encompass all the ship-to address components that a consumer is willing to provide). The labeling, marshalling, and unmarshalling of the components of such aggregates depend on the data transfer protocol used. The suggested syntax is XML as specified in Section 2.2.

2.1.1. The Field List

The table below is the ECML v2 field list.

The NAME column gives the structured string name of each field as explained above. The MIN column below is the minimum data size that MUST be allowed for on data entry. It is NOT the minimum size for valid contents of the field, and merchant software should, in many cases, be prepared to receive a longer or shorter value. Merchants dealing with areas where, for example, the state/province name or phone number is longer than the MIN given below obviously must permit longer data entry. In some cases, however, there is a maximum size that makes sense, and where this is the case, it is usually documented in a Note for the field.

The following fields are typically used to communicate from the customer to the merchant:

| FIELD | NAME | MIN | Notes |
|-------------------------|----------------------------------|-----|-------|
| ship to title | Ecom_ShipTo_Postal_Name_Prefix | 4 | (1) |
| ship to first name | Ecom_ShipTo_Postal_Name_First | 15 | (54) |
| ship to middle name | Ecom_ShipTo_Postal_Name_Middle | 15 | (2) |
| ship to last name | Ecom_ShipTo_Postal_Name_Last | 15 | (54) |
| ship to name suffix | Ecom_ShipTo_Postal_Name_Suffix | 4 | (3) |
| ship to company name | Ecom_ShipTo_Postal_Company | 20 | |
| ship to street line1 | Ecom_ShipTo_Postal_Street_Line1 | 20 | (4) |
| ship to street line2 | Ecom_ShipTo_Postal_Street_Line2 | 20 | (4) |
| ship to street line3 | Ecom_ShipTo_Postal_Street_Line3 | 20 | (4) |
| ship to city | Ecom_ShipTo_Postal_City | 22 | |
| ship to state/province | Ecom_ShipTo_Postal_StateProv | 2 | (5) |
| ship to zip/postal code | Ecom_ShipTo_Postal_PostalCode | 14 | (6) |
| ship to country | Ecom_ShipTo_Postal_CountryCode | 2 | (7) |
| ship to phone | Ecom_ShipTo_Telecom_Phone_Number | 10 | (8) |
| ship to email | Ecom_ShipTo_Online_Email | 40 | (9) |

| | | | |
|---------------------------|-------------------------------------|----|------|
| bill to title | Ecom_BillTo_Postal_Name_Prefix | 4 | (1) |
| bill to first name | Ecom_BillTo_Postal_Name_First | 15 | (54) |
| bill to middle name | Ecom_BillTo_Postal_Name_Middle | 15 | (2) |
| bill to last name | Ecom_BillTo_Postal_Name_Last | 15 | (54) |
| bill to name suffix | Ecom_BillTo_Postal_Name_Suffix | 4 | (3) |
| bill to company name | Ecom_BillTo_Postal_Company | 20 | |
| bill to street line1 | Ecom_BillTo_Postal_Street_Line1 | 20 | (4) |
| bill to street line2 | Ecom_BillTo_Postal_Street_Line2 | 20 | (4) |
| bill to street line3 | Ecom_BillTo_Postal_Street_Line3 | 20 | (4) |
| bill to city | Ecom_BillTo_Postal_City | 22 | |
| bill to state/province | Ecom_BillTo_Postal_StateProv | 2 | (5) |
| bill to zip/postal code | Ecom_BillTo_Postal_PostalCode | 14 | (6) |
| bill to country | Ecom_BillTo_Postal_CountryCode | 2 | (7) |
| bill to phone | Ecom_BillTo_Telecom_Phone_Number | 10 | (8) |
| bill to email | Ecom_BillTo_Online_Email | 40 | (9) |
| receipt to | | | (32) |
| receipt to title | Ecom_ReceiptTo_Postal_Name_Prefix | 4 | (1) |
| receipt to first name | Ecom_ReceiptTo_Postal_Name_First | 15 | (54) |
| receipt to middle name | Ecom_ReceiptTo_Postal_Name_Middle | 15 | (2) |
| receipt to last name | Ecom_ReceiptTo_Postal_Name_Last | 15 | (54) |
| receipt to name suffix | Ecom_ReceiptTo_Postal_Name_Suffix | 4 | (3) |
| receipt to company name | Ecom_ReceiptTo_Postal_Company | 20 | |
| receipt to street line1 | Ecom_ReceiptTo_Postal_Street_Line1 | 20 | (4) |
| receipt to street line2 | Ecom_ReceiptTo_Postal_Street_Line2 | 20 | (4) |
| receipt to street line3 | Ecom_ReceiptTo_Postal_Street_Line3 | 20 | (4) |
| receipt to city | Ecom_ReceiptTo_Postal_City | 22 | |
| receipt to state/province | Ecom_ReceiptTo_Postal_StateProv | 2 | (5) |
| receipt to postal code | Ecom_ReceiptTo_Postal_PostalCode | 14 | (6) |
| receipt to country | Ecom_ReceiptTo_Postal_CountryCode | 2 | (7) |
| receipt to phone | Ecom_ReceiptTo_Telecom_Phone_Number | 10 | (8) |
| receipt to email | Ecom_ReceiptTo_Online_Email | 40 | (9) |
| name on card | Ecom_Payment_Card_Name | 30 | (10) |
| card type | Ecom_Payment_Card_Type | 4 | (11) |
| card number | Ecom_Payment_Card_Number | 19 | (12) |
| card verification value | Ecom_Payment_Card_Verification | 4 | (13) |
| card issuer number | Ecom_Payment_Card_IssueNumber | 2 | (53) |
| card expire date day | Ecom_Payment_Card_ExpDate_Day | 2 | (14) |
| card expire date month | Ecom_Payment_Card_ExpDate_Month | 2 | (15) |
| card expire date year | Ecom_Payment_Card_ExpDate_Year | 4 | (16) |
| card valid date day | Ecom_Payment_Card_ValidFrom_Day | 2 | (14) |
| card valid date month | Ecom_Payment_Card_ValidFrom_Month | 2 | (15) |
| card valid date year | Ecom_Payment_Card_ValidFrom_Year | 4 | (16) |

| | | | |
|---------------------------|-----------------------------------|-----|------|
| card protocols | Ecom_Payment_Card_Protocol | 20 | (17) |
| loyalty card name | Ecom_Loyalty_Card_Name | 30 | (10) |
| loyalty card type | Ecom_Loyalty_Card_Type | 20 | (52) |
| loyalty card number | Ecom_Loyalty_Card_Number | 40 | (34) |
| loyalty card verification | Ecom_Loyalty_Card_Verification | 4 | (13) |
| loyalty card expire day | Ecom_Loyalty_Card_ExpDate_Day | 2 | (14) |
| loyalty card expire month | Ecom_Loyalty_Card_ExpDate_Month | 2 | (15) |
| loyalty card expire year | Ecom_Loyalty_Card_ExpDate_Year | 2 | (16) |
| loyalty card valid day | Ecom_Loyalty_Card_ValidFrom_Day | 2 | (14) |
| loyalty card valid month | Ecom_Loyalty_Card_ValidFrom_Month | 2 | (15) |
| loyalty card valid year | Ecom_Loyalty_Card_ValidFrom_Year | 4 | (16) |
| consumer order ID | Ecom_ConsumerOrderID | 20 | (18) |
| user ID | Ecom_User_ID | 40 | (19) |
| user password | Ecom_User_Password | 20 | (19) |
| user certificate | Ecom_User_Certificate_URL | 128 | (55) |
| user data country | Ecom_UserData_Country | 2 | (7) |
| user data language | Ecom_UserData_Language | 30 | (33) |
| user data gender | Ecom_UserData_Gender | 1 | (36) |
| user data birth day | Ecom_UserData_BirthDate_Day | 2 | (14) |
| user data birth month | Ecom_UserData_BirthDate_Month | 2 | (15) |
| user data birth year | Ecom_UserData_BirthDate_Year | 4 | (16) |
| user data preferences | Ecom_UserData_Preferences | 60 | (34) |
| schema version | Ecom_SchemaVersion | 30 | (20) |
| wallet id | Ecom_WalletID | 40 | (21) |
| wallet URL | Ecom_Wallet_Location | 128 | (35) |
| customer device ID | Ecom_Device_ID | 20 | (37) |
| customer device type | Ecom_Device_Type | 20 | (38) |
| end transaction flag | Ecom_TransactionComplete | - | (22) |

The following fields are typically used to communicate from the merchant to the consumer:

| FIELD | NAME | Min | Notes |
|-------------------------|-------------------------------|-----|-------|
| merchant home domain | Ecom_Merchant | 128 | (23) |
| processor home domain | Ecom_Processor | 128 | (24) |
| transaction identifier | Ecom_Transaction_ID | 128 | (25) |
| transaction URL inquiry | Ecom_Transaction_Inquiry | 500 | (26) |
| transaction amount | Ecom_Transaction_Amount | 128 | (27) |
| transaction currency | Ecom_Transaction_CurrencyCode | 3 | (28) |
| transaction date | Ecom_Transaction_Date | 80 | (29) |

| | | | |
|-----------------------|----------------------------|-----|------|
| transaction type | Ecom_Transaction_Type | 24 | (30) |
| transaction signature | Ecom_Transaction_Signature | 160 | (31) |
| end transaction flag | Ecom_TransactionComplete | - | (22) |

The following fields are used to communicate between the merchant and a processor acting for the merchant (such a processor is commonly called an acquirer and is frequently a bank):

| FIELD | NAME | Min | Notes |
|-----------------------------|---------------------------------|-----|-------|
| merchant identifier | Ecom_Merchant_ID | 8 | |
| merchant terminal | Ecom_Merchant_Terminal_ID | 8 | (39) |
| merchant terminal data | Ecom_Merchant_Terminal_Data | 128 | |
| transaction process code | Ecom_Transaction_ProcessingCode | 6 | (40) |
| transaction reference | Ecom_Transaction_Reference_ID | 12 | |
| transaction acquirer | Ecom_Transaction_Acquire_ID | 13 | (41) |
| transaction forward | Ecom_Transaction_Forward_ID | 13 | (42) |
| transaction trace | Ecom_Transaction_Trace_Audit | 6 | (43) |
| transaction effective date | Ecom_Transaction_Effective_Date | 4 | (44) |
| transaction CID | Ecom_Transaction_CID | 8 | |
| transaction POS | Ecom_Transaction_POSCode | 12 | (45) |
| transaction private use | Ecom_Transaction_PrivateUseData | 166 | |
| transaction response | Ecom_Transaction_ResponseData | 27 | |
| transaction approval code | Ecom_Transaction_ApprovalCode | 12 | (46) |
| transaction retrieval code | Ecom_Transaction_RetrievalCode | 128 | |
| transaction response action | Ecom_Transaction_ActionCode | 13 | (47) |
| transaction reason | Ecom_Transaction_ReasonCode | 4 | |
| transaction AAV | Ecom_Transaction_AAV | 3 | |
| transaction settlement date | Ecom_Transaction_Settle_Date | 4 | (48) |
| transaction capture date | Ecom_Transaction_Capture_Date | 4 | (49) |
| transaction Track 1 | Ecom_Transaction_Track1 | 39 | (50) |
| transaction Track 2 | Ecom_Transaction_Track2 | 39 | (51) |

2.1.2. Field Footnotes

- (1) For example: Mr., Mrs., Ms., Dr. This field is commonly omitted.
- (2) May also be used for middle initial.
- (3) For example: Ph.D., Jr. (Junior), 3rd, Esq. (Esquire). This field is commonly omitted.
- (4) Address lines must be filled in the order line1, then line2, and last line3. Thus, for example, it is an error for line1 to be null if line2 or line3 is not.

- (5) 2 characters are the minimum for the US and Canada; other countries may require longer fields. For the US, use 2-character US postal state abbreviation.
- (6) Minimum field lengths for Postal Code will vary according to the international market served. Use 5-character postal code or 5+4 ZIP for the US and 6-character postal code for Canada. The size given, 14, is believed to be the maximum required anywhere in the world.
- (7) Use [ISO3166] standard two letter country codes.
- (8) 10 digits are the minimum for numbers within the North American Numbering Plan (<<http://www.nanpa.com>>: It includes the US, Canada and a number of Caribbean and smaller Pacific nations, but not Cuba). Other countries may require longer fields. Telephone numbers are complicated by differing international access codes, variant punctuation of area/city codes within countries, etc. Although it is desirable for telephone numbers to be in standard international format [E.164], it may be necessary to use heuristics or human examination based on the telephone number and addresses given to figure out how to call a customer, since people may enter local formatted numbers without area/access codes. It is recommend that an "x" be placed before extension numbers and that the "x" and extension number appear after all other parts of the number.
- (9) For example: jsmith@example.com
- (10) The name of the cardholder as it appears on the card.
- (11) Case insensitive. Use up to the first 4 letters of the association name (see also Note 102):

| | |
|------|----------------------|
| AMER | American Express |
| BANK | Bankcard (Australia) |
| DC | DC (Japan) |
| DINE | Diners Club |
| DISC | Discover |
| JCB | JCB |
| MAST | Mastercard |
| NIKO | Nikos (Japan) |
| SAIS | Saison (Japan) |
| UC | UC (Japan) |
| UCAR | UCard (Taiwan) |
| VISA | Visa |

- (12) Includes the check digit at the end but no spaces or hyphens [ISO7812]. The min given, 19, is the longest number permitted under the ISO standard.
- (13) An additional cardholder verification number printed on the card (but not embossed or recorded on the magnetic stripe) such as the American Express CIV, MasterCard CVC2, and Visa CVV2 values.
- (14) The day of the month. Values: 1-31. A leading zero is ignored, so, for example, 07 is valid for the seventh day of the month.
- (15) The month of the year. Jan - 1, Feb - 2, March - 3, etc.; Values: 1-12. A leading zero is ignored, so, for example, 07 is valid for July.
- (16) The value in the wallet cell is always four digits; e.g., 1999, 2000, 2001.
- (17) A space separated list of protocols available in connection with the specified card. The following is the initial list of case-insensitive tokens:

none
set
setcert
iotp
echeck
simcard
phoneid

"Set" indicates that the card is usable with SET protocol (i.e., it is in a SET wallet) but that it does not have a SET certificate [SET]. "Setcert" indicates that the card is usable with SET and has a set certificate [SET]. "iotp" indicates that the IOTP protocol [RFC2801] is supported at the customer. "echeck" indicates that the eCheck protocol [eCheck] is supported at the customer. "simcard" indicates an ability to use the transaction instrument built into a Cellphone subscriber for identification. "phoneid" indicates use for the transaction of a billable phone number. "None" indicates that automatic field fill is operating but that there is no further information.

- (18) A unique order ID string generated by the consumer software.
- (19) The user ID and password fields can be used if the user has a pre-established account with the merchant to which access is authenticated by such values. For that use, one would expect an

application to require exactly one user ID, and one password field be present.

- (20) URI [RFC3986] indicating version of this set of fields. Equal to "urn:ietf:params:ecml:v2.0" for this version. See Section 5. (See also Note 101.)
- (21) A string to identify the source and version of form fill software that is acting on behalf of a user. Should contain company and/or product name and version; for example, "Wallets Inc., SuperFill, v42.7". (See also Note 101.)
- (22) A flag to indicate that this web-page/aggregate is the final one for this transaction. (See also Note 101.)
- (23) The merchant domain name [RFC1034], such as www.merchant.example. (See also Note 101.)
- (24) The domain name [RFC1034] of the gateway transaction processor that is actually accepting the payment on behalf of the merchant, such as www.processor.example. (See also Note 101.)
- (25) A Transaction identification string whose format is specific to the processor.
- (26) A URL [RFC3986] that can be invoked to inquire about the transaction. (See also Note 100.)
- (27) The amount of the transaction in ISO currency format [ISO4217]. This is two integer numbers with a period in between but with no other currency mark (such as a "\$" dollar sign).
- (28) This is the three-letter ISO currency code [ISO4217]. For example, US dollars is USD.
- (29) ISO Transaction date.
- (30) The type of the transaction, if known. Currently a value from the following list:
 - debit
 - credit
- (31) A digital signature, base64 encoded [RFC2045]. (See also Note 101.)

- (32) The ReceiptTo fields are used when the BillTo entity, location, or address and the ReceiptTo entity, location, or address are different. For example, when using some forms of Corporate Purchasing Cards or Agent Purchasing Cards, the individual card holder would be in the ReceiptTo fields, and the corporate or other owner would be in the BillTo fields.
- (33) An IETF Language Tag, as defined in [RFC3066].
- (34) User preferences, as specified by the merchant. (See also Note 102.)
- (35) The Uniform Resource Locator [RFC3986] for accessing the customer's "wallet" software. (See also Note 100)
- (36) A single capital letter: M=male, F=Female, U=Unknown [ISO5218].
- (37) An immutable device identification or serial number. (See also Note 102.)
- (38) User understandable device brand name. (See also Note 102)
- (39) [ISO8583] field "card acceptor terminal identification".
- (40) [ISO8583] field "processing code".
- (41) [ISO8583] field "acquiring institution identification code".
- (42) [ISO8583] field "forwarding institution identification code".
- (43) [ISO8583] field "system trace audit field".
- (44) [ISO8583] field "date effective".
- (45) [ISO8583] field "point of sale date code".
- (46) [ISO8583] field "approval code".
- (47) [ISO8583] field "action code".
- (48) [ISO8583] field "date settlement".
- (49) [ISO8583] field "date capture".
- (50) [ISO8583] field "trace 1 data".
- (51) [ISO8583] field "trace 2 data".

- (52) User-recognizable loyalty card brand name. Values for this field are not controlled, and there is no IANA or other registry for them. (See also Note 102.)
- (53) The card issuer number required by the UK-based Switch and Solo acquirers.
- (54) The field names "first_name" and "last_name" have been retained for compatibility with earlier versions of ECML. However, "last_name" should be understood to refer to family or inherited names(s), whereas "first_name" is the first given or non-inherited name and "middle_name" is the subsequent given or non-inherited name or names, if any.
- (55) The Uniform Resource Locator [RFC3986] for accessing the user's X.509v3 certificate encoded as binary DER. (See also Note 100.)

Meta Notes (referenced by other notes)

- (100) ECML, a basic field-naming and structuring convention, does not impose any particular requirements on these URLs. It is to be expected that most applications that make use of ECML will impose such limitations and perform checking to be sure that provided URLs conform to such limitations before attempting to invoke them.
- (101) This is a field that, when presented in a web page, is usually hidden.
- (102) An ASCII [ASCII] character string with no leading or trailing white space.

2.2. Exemplar XML Syntax

The following sections provide an XML DTD and an XML Schema that express the ECML fields with ECML v2 naming and ECML v2 hierarchical structure. In case of conflict between this DTD and Schema, the Schema should prevail. Note that the ECML v2 naming and structure may be used in non-XML syntaxes.

The ECML v2 XML syntax is deliberately liberal because it is assumed that specific applications making use of ECML will impose their own additional constraints.

For internationalization of ECML, use the general XML character-encoding provisions [XML] (which mandate support of UTF-8 and UTF-16 and permit support of other character sets) and the `xml:lang` attribute, which may be used to specify language information.

2.2.1. ECML v2 XML DTD

The following is an XML DTD for ECML v2.

```

<!-- Electronic Commerce Modeling Language v2 -->

<!ELEMENT Ecom ( #PCDATA | ShipTo | BillTo | ReceiptTo | Payment |
                  Loyalty | User | Merchant | Transaction |
                  TransactionComplete )* >
<!ATTLIST Ecom
    id          ID          #IMPLIED
    ConsumerOrderID CDATA #IMPLIED
    Merchant    CDATA      #IMPLIED
    Mode        (Query|Assert) #IMPLIED
    Processor   CDATA      #IMPLIED
    SchemaVersion (urn:ietf:params:ecml:v2.0)
                  #IMPLIED
    WalletID    CDATA      #IMPLIED
    WalletLocation CDATA #IMPLIED >

<!ELEMENT ShipTo ( #PCDATA | Postal | Telecom | Online )* >
<!ATTLIST ShipTo
    id          ID          #IMPLIED
    Mode        (Query|Assert) #IMPLIED >

<!ELEMENT BillTo ( #PCDATA | Postal | Telecom | Online )* >
<!ATTLIST BillTo
    id          ID          #IMPLIED
    Mode        (Query|Assert) #IMPLIED >

<!ELEMENT ReceiptTo ( #PCDATA | Postal | Telecom | Online )* >
<!ATTLIST ReceiptTo
    id          ID          #IMPLIED
    Mode        (Query|Assert) #IMPLIED >

<!ELEMENT Postal ( #PCDATA | Name | Company |
                   Street | City | StateProv )* >
<!ATTLIST Postal
    id          ID          #IMPLIED
    PostalCode  NMTOKEN    #IMPLIED
    Mode        (Query|Assert) #IMPLIED
    CountryCode NMTOKEN    #IMPLIED >

<!ELEMENT Name EMPTY >
<!ATTLIST Name
    id          ID          #IMPLIED
    Mode        (Query|Assert) #IMPLIED

```


| | | |
|--------|---------|------------|
| Prefix | NMTOKEN | #IMPLIED |
| First | NMTOKEN | #IMPLIED |
| Middle | NMTOKEN | #IMPLIED |
| Last | NMTOKEN | #IMPLIED |
| Suffix | NMTOKEN | #IMPLIED > |

<!ELEMENT Street EMPTY >

<!ATTLIST Street

| | | |
|-------|----------------|------------|
| id | ID | #IMPLIED |
| Mode | (Query Assert) | #IMPLIED |
| Line1 | CDATA | #REQUIRED |
| Line2 | CDATA | #IMPLIED |
| Line3 | CDATA | #IMPLIED > |

<!ELEMENT Company (#PCDATA) >

<!ATTLIST Company

| | | |
|------|----------------|------------|
| Mode | (Query Assert) | #IMPLIED > |
|------|----------------|------------|

<!ELEMENT City (#PCDATA) >

<!ATTLIST City

| | | |
|------|----------------|------------|
| Mode | (Query Assert) | #IMPLIED > |
|------|----------------|------------|

<!ELEMENT StateProv (#PCDATA) >

<!ATTLIST StateProv

| | | |
|------|----------------|------------|
| Mode | (Query Assert) | #IMPLIED > |
|------|----------------|------------|

<!ELEMENT Telecom (#PCDATA | Phone) * >

<!ATTLIST Telecom

| | | |
|------|----------------|------------|
| Mode | (Query Assert) | #IMPLIED > |
|------|----------------|------------|

<!ELEMENT Phone EMPTY >

<!ATTLIST Phone

| | | |
|--------|----------------|-------------|
| id | ID | #IMPLIED |
| Mode | (Query Assert) | #IMPLIED |
| Number | CDATA | #REQUIRED > |

<!ELEMENT Online (#PCDATA | Email) * >

<!ATTLIST Online

| | | |
|------|----------------|------------|
| Mode | (Query Assert) | #IMPLIED > |
|------|----------------|------------|

<!ELEMENT Email EMPTY >

<!ATTLIST Email

| | | |
|---------|----------------|-------------|
| id | ID | #IMPLIED |
| Mode | (Query Assert) | #IMPLIED |
| Address | CDATA | #REQUIRED > |

<!ELEMENT Payment (Card) >

<!ATTLIST Payment


```

Mode          (Query|Assert) #IMPLIED >

<!ELEMENT Card (ExpDate, ValidDate?) >
<!ATTLIST Card
  id          ID          #IMPLIED
  Mode        (Query|Assert) #IMPLIED
  Name        CDATA       #IMPLIED
  Type        NMTOKEN     #IMPLIED
  Number      NMTOKEN     #REQUIRED
  Protocols   NMTOKENS    #IMPLIED
  Verification NMTOKEN     #IMPLIED
  Issuer      NMTOKEN     #IMPLIED >

<!ELEMENT Loyalty (ExpDate?, ValidDate?) >
<!ATTLIST Loyalty
  id          ID          #IMPLIED
  Mode        (Query|Assert) #IMPLIED
  Name        CDATA       #IMPLIED
  Type        NMTOKEN     #IMPLIED
  Number      NMTOKEN     #REQUIRED
  Verification NMTOKEN     #IMPLIED >

<!ELEMENT ExpDate EMPTY >
<!ATTLIST ExpDate
  id          ID          #IMPLIED
  Mode        (Query|Assert) #IMPLIED
  Day         NMTOKEN     #IMPLIED
  Month       NMTOKEN     #REQUIRED
  Year        NMTOKEN     #REQUIRED >

<!ELEMENT ValidDate EMPTY >
<!ATTLIST ValidDate
  id          ID          #IMPLIED
  Mode        (Query|Assert) #IMPLIED
  Day         NMTOKEN     #IMPLIED
  Month       NMTOKEN     #IMPLIED
  Year        NMTOKEN     #REQUIRED >

<!ELEMENT User ( #PCDATA | UserID | Password )* >
<!ATTLIST User
  id          ID          #IMPLIED
  Mode        (Query|Assert) #IMPLIED
  CertificateURL CDATA     #IMPLIED
  DataCountry NMTOKEN     #IMPLIED
  DataLanguage CDATA      #IMPLIED >

<!ELEMENT UserID (#PCDATA) >
<!ATTLIST UserID

```



```

Mode          (Query|Assert) #IMPLIED >

<!--ELEMENT Password (#PCDATA) >
<!--ATTLIST Password
Mode          (Query|Assert) #IMPLIED >

<!--ELEMENT Merchant (Terminal) >
<!--ATTLIST Merchant
Mode          (Query|Assert) #IMPLIED
id            ID            #IMPLIED >

<!--ELEMENT Terminal EMPTY >
<!--ATTLIST Terminal
Id            ID            #IMPLIED
Mode          (Query|Assert) #IMPLIED
Data          CDATA        #IMPLIED >

<!--ELEMENT Transaction ( #PCDATA | Id | Code | Date | Data |
                        Inquiry | Signature ) * >
<!--ATTLIST Transaction
Amount        CDATA        #IMPLIED
Currency      NMTOKEN      #IMPLIED
Mode          (Query|Assert) #IMPLIED
Type          NMTOKEN      #IMPLIED >

<!--ELEMENT Id EMPTY >
<!--ATTLIST Id
Id            ID            #IMPLIED
Mode          (Query|Assert) #IMPLIED
CID          NMTOKEN      #IMPLIED
Reference     NMTOKEN      #IMPLIED
Acquire       NMTOKEN      #IMPLIED
Forward       NMTOKEN      #IMPLIED >

<!--ELEMENT Code EMPTY >
<!--ATTLIST Code
Mode          (Query|Assert) #IMPLIED
Processing    CDATA        #IMPLIED
Approval      NMTOKEN      #IMPLIED
Retrieval     NMTOKEN      #IMPLIED
Action        NMTOKEN      #IMPLIED
Reason        NMTOKEN      #IMPLIED
POS           NMTOKEN      #IMPLIED >

<!--ELEMENT Date (Effective?, Settle?, Capture?) >
<!--ATTLIST Date
Mode          (Query|Assert) #IMPLIED
id            ID            #IMPLIED >

```



```

<!ELEMENT Effective EMPTY >
<!ATTLIST Effective
    id          ID          #IMPLIED
    Mode        (Query|Assert) #IMPLIED
    Day         NMTOKEN     #REQUIRED
    Month       NMTOKEN     #REQUIRED
    Year        NMTOKEN     #REQUIRED >

<!ELEMENT Settle EMPTY >
<!ATTLIST Settle
    id          ID          #IMPLIED
    Mode        (Query|Assert) #IMPLIED
    Day         NMTOKEN     #REQUIRED
    Month       NMTOKEN     #REQUIRED
    Year        NMTOKEN     #REQUIRED >

<!ELEMENT Capture EMPTY >
<!ATTLIST Capture
    id          ID          #IMPLIED
    Mode        (Query|Assert) #IMPLIED
    Day         NMTOKEN     #REQUIRED
    Month       NMTOKEN     #REQUIRED
    Year        NMTOKEN     #REQUIRED >

<!ELEMENT Data (#PCDATA | Trace | PrivateUse | Response |
    AAV | Track1 | Track2 ) * >
<!ATTLIST Data
    Mode        (Query|Assert) #IMPLIED >

<!ELEMENT Trace (#PCDATA) >
<!ATTLIST Trade
    id          ID          #IMPLIED
    Mode        (Query|Assert) #IMPLIED >

<!ELEMENT PrivateUse (#PCDATA) >
<!ATTLIST PrivateUse
    id          ID          #IMPLIED
    Mode        (Query|Assert) #IMPLIED >

<!ELEMENT Response (#PCDATA) >
<!ATTLIST Response
    id          ID          #IMPLIED
    Mode        (Query|Assert) #IMPLIED >

<!ELEMENT AAV (#PCDATA) >
<!ATTLIST AAV
    id          ID          #IMPLIED
    Mode        (Query|Assert) #IMPLIED >

```



```

<!ELEMENT Track1 (#PCDATA) >
<!ATTLIST Track1
      id          ID          #IMPLIED
      Mode        (Query|Assert) #IMPLIED >

<!ELEMENT Track2 (#PCDATA) >
<!ATTLIST Track2
      id          ID          #IMPLIED
      Mode        (Query|Assert) #IMPLIED >

<!ELEMENT Inquiry (#PCDATA) >
<!ATTLIST Inquiry
      id          ID          #IMPLIED
      Mode        (Query|Assert) #IMPLIED >

<!ELEMENT Signature (#PCDATA) >
<!ATTLIST Signature
      id          ID          #IMPLIED
      Mode        (Query|Assert) #IMPLIED >

<!ELEMENT TransactionComplete EMPTY >

```

2.2.2. ECML v2 XML Schema

The following is an XML Schema for ECML v2.

```

<?xml version="1.0" encoding="utf-8"?>
<!-- Electronic Commerce Modeling Language v2 -->

<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">

  <xs:attribute name="Mode">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:enumeration value="Query"/>
        <xs:enumeration value="Assert"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:attribute>
  <xs:attribute name="id" type="xs:ID"/>
  <xs:complexType name="EcomSimpleText">
    <xs:simpleContent>
      <xs:extension base="xs:string">
        <xs:attribute ref="Mode" use="optional"/>
        <xs:attribute ref="id" use="optional"/>
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>

```



```
</xs:complexType>

<xs:element name="Ecom">
  <xs:complexType mixed="true">
    <xs:choice minOccurs="0" maxOccurs="unbounded">
      <xs:element ref="ShipTo"/>
      <xs:element ref="BillTo"/>
      <xs:element ref="ReceiptTo"/>
      <xs:element ref="Payment"/>
      <xs:element ref="Loyalty"/>
      <xs:element ref="User"/>
      <xs:element ref="Merchant"/>
      <xs:element ref="Transaction"/>
      <xs:element ref="TransactionComplete"/>
    </xs:choice>
    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute ref="id" use="optional"/>
    <xs:attribute name="ConsumerOrderID" use="optional"/>
    <xs:attribute name="Merchant" use="optional"/>
    <xs:attribute name="Processor" use="optional"/>
    <xs:attribute name="SchemaVersion" type="xs:string"
      fixed="urn:ietf:params:ecml:v2.0"/>
    <xs:attribute name="WalletID" use="optional"/>
    <xs:attribute name="WalletLocation" type="xs:anyURI"
      use="optional"/>
  </xs:complexType>
</xs:element>
<xs:element name="ShipTo">
  <xs:complexType mixed="true">
    <xs:choice minOccurs="0" maxOccurs="unbounded">
      <xs:element ref="Postal"/>
      <xs:element ref="Telecom"/>
      <xs:element ref="Online"/>
    </xs:choice>
    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute ref="id" use="optional"/>
  </xs:complexType>
</xs:element>
<xs:element name="BillTo">
  <xs:complexType mixed="true">
    <xs:choice minOccurs="0" maxOccurs="unbounded">
      <xs:element ref="Postal"/>
      <xs:element ref="Telecom"/>
      <xs:element ref="Online"/>
    </xs:choice>
    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute ref="id" use="optional"/>
  </xs:complexType>
</xs:element>
```



```
</xs:element>
<xs:element name="ReceiptTo">
  <xs:complexType mixed="true">
    <xs:choice minOccurs="0" maxOccurs="unbounded">
      <xs:element ref="Postal"/>
      <xs:element ref="Telecom"/>
      <xs:element ref="Online"/>
    </xs:choice>
    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute ref="id" use="optional"/>
  </xs:complexType>
</xs:element>
<xs:element name="Postal">
  <xs:complexType mixed="true">
    <xs:choice minOccurs="0" maxOccurs="unbounded">
      <xs:element ref="Name"/>
      <xs:element ref="Company"/>
      <xs:element ref="Street"/>
      <xs:element ref="City"/>
      <xs:element ref="StateProv"/>
    </xs:choice>
    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute ref="id" use="optional"/>
    <xs:attribute name="PostalCode" type="xs:NMTOKEN"
      use="optional"/>
    <xs:attribute name="CountryCode" type="xs:NMTOKEN"
      use="optional"/>
  </xs:complexType>
</xs:element>
<xs:element name="Telecom">
  <xs:complexType mixed="true">
    <xs:sequence maxOccurs="unbounded">
      <xs:element name="Phone">
        <xs:complexType>
          <xs:attribute ref="Mode" use="optional"/>
          <xs:attribute ref="id" use="optional"/>
          <xs:attribute name="Number"/>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
    <xs:attribute ref="Mode" use="optional"/>
  </xs:complexType>
</xs:element>
<xs:element name="Online">
  <xs:complexType mixed="true">
    <xs:sequence maxOccurs="unbounded">
      <xs:element name="Email">
        <xs:complexType>
```



```

        <xs:attribute ref="Mode" use="optional"/>
        <xs:attribute ref="id" use="optional"/>
        <xs:attribute name="Address"/>
    </xs:complexType>
</xs:element>
</xs:sequence>
    <xs:attribute ref="Mode" use="optional"/>
</xs:complexType>
</xs:element>
<xs:element name="Payment">
    <xs:complexType>
        <xs:sequence>
            <xs:element name="Card">
                <xs:complexType>
                    <xs:sequence>
                        <xs:element ref="ExpDate"/>
                        <xs:element ref="ValidDate" minOccurs="0"/>
                    </xs:sequence>
                    <xs:attribute ref="Mode" use="optional"/>
                    <xs:attribute ref="id" use="optional"/>
                    <xs:attribute name="Name" use="optional"/>
                    <xs:attribute name="Type" type="xs:NMTOKEN"
                        use="optional"/>
                    <xs:attribute name="Number" type="xs:decimal"/>
                    <xs:attribute name="Protocols" type="xs:NMTOKENS"
                        use="optional"/>
                    <xs:attribute name="Verification"
                        type="xs:NMTOKEN" use="optional"/>
                    <xs:attribute name="Issuer" type="xs:NMTOKEN"
                        use="optional"/>
                </xs:complexType>
            </xs:element>
        </xs:sequence>
        <xs:attribute ref="Mode" use="optional"/>
    </xs:complexType>
</xs:element>
<xs:element name="Loyalty">
    <xs:complexType>
        <xs:sequence>
            <xs:element ref="ExpDate"/>
            <xs:element ref="ValidDate" minOccurs="0"/>
        </xs:sequence>
        <xs:attribute ref="Mode" use="optional"/>
        <xs:attribute ref="id" use="optional"/>
        <xs:attribute name="Name" use="optional"/>
        <xs:attribute name="Type" type="xs:NMTOKEN"
            use="optional"/>
        <xs:attribute name="Number" type="xs:NMTOKEN"/>
    </xs:complexType>
</xs:element>

```



```
        <xs:attribute name="Verification" type="xs:NMTOKEN"
            use="optional"/>
    </xs:complexType>
</xs:element>
<xs:element name="ExpDate">
    <xs:complexType>
        <xs:attribute ref="Mode" use="optional"/>
        <xs:attribute ref="id" use="optional"/>
        <xs:attribute name="Day" type="xs:positiveInteger"/>
        <xs:attribute name="Month" type="xs:positiveInteger"/>
        <xs:attribute name="Year" type="xs:positiveInteger"/>
    </xs:complexType>
</xs:element>
<xs:element name="ValidDate">
    <xs:complexType>
        <xs:attribute ref="Mode" use="optional"/>
        <xs:attribute ref="id" use="optional"/>
        <xs:attribute name="Day" type="xs:positiveInteger"/>
        <xs:attribute name="Month" type="xs:positiveInteger"/>
        <xs:attribute name="Year" type="xs:positiveInteger"/>
    </xs:complexType>
</xs:element>
<xs:element name="User">
    <xs:complexType mixed="true">
        <xs:choice minOccurs="0" maxOccurs="unbounded">
            <xs:element ref="UserID"/>
            <xs:element ref="Password"/>
        </xs:choice>
        <xs:attribute ref="Mode" use="optional"/>
        <xs:attribute ref="id" use="optional"/>
        <xs:attribute name="CertificateURL" type="xs:anyURI"
            use="optional"/>
        <xs:attribute name="DataCountry" type="xs:NMTOKEN"
            use="optional"/>
        <xs:attribute name="DataLanguage" type="xs:language"
            use="optional"/>
    </xs:complexType>
</xs:element>
<xs:element name="Transaction">
    <xs:complexType mixed="true">
        <xs:choice minOccurs="0" maxOccurs="unbounded">
            <xs:element ref="Id"/>
            <xs:element ref="Code"/>
            <xs:element ref="Date"/>
            <xs:element ref="Data"/>
            <xs:element ref="Inquiry"/>
            <xs:element ref="Signature"/>
        </xs:choice>
    </xs:complexType>
</xs:element>
```



```

    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute name="Currency" type="xs:NMTOKEN"
      use="optional"/>
    <xs:attribute name="Type" type="xs:NMTOKEN"
      use="optional"/>
  </xs:complexType>
</xs:element>
<xs:element name="Date">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="Effective" minOccurs="0"/>
      <xs:element ref="Settle" minOccurs="0"/>
      <xs:element ref="Capture" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute ref="id" use="optional"/>
  </xs:complexType>
</xs:element>
<xs:element name="Data">
  <xs:complexType mixed="true">
    <xs:choice minOccurs="0" maxOccurs="unbounded">
      <xs:element ref="Trace"/>
      <xs:element ref="PrivateUse"/>
      <xs:element ref="Response"/>
      <xs:element ref="AAV"/>
      <xs:element ref="Track1"/>
      <xs:element ref="Track2"/>
    </xs:choice>
    <xs:attribute ref="Mode" use="optional"/>
  </xs:complexType>
</xs:element>
<xs:element name="Merchant">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="Terminal">
        <xs:complexType>
          <xs:attribute ref="Mode" use="optional"/>
          <xs:attribute ref="id" use="optional"/>
          <xs:attribute name="Data" use="optional"/>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute ref="id" use="optional"/>
  </xs:complexType>
</xs:element>

<xs:element name="AAV" type="EcomSimpleText"/>

```



```
<xs:element name="Capture">
  <xs:complexType>
    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute ref="id" use="optional"/>
    <xs:attribute name="Day" type="xs:NMTOKEN"/>
    <xs:attribute name="Month" type="xs:NMTOKEN"/>
    <xs:attribute name="Year" type="xs:NMTOKEN"/>
  </xs:complexType>
</xs:element>
<xs:element name="City" type="EcomSimpleText"/>
<xs:element name="Code">
  <xs:complexType>
    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute name="Processing" use="optional"/>
    <xs:attribute name="Approval" type="xs:NMTOKEN"
      use="optional"/>
    <xs:attribute name="Retrieval" type="xs:NMTOKEN"
      use="optional"/>
    <xs:attribute name="Action" type="xs:NMTOKEN"
      use="optional"/>
    <xs:attribute name="Reason" type="xs:NMTOKEN"
      use="optional"/>
    <xs:attribute name="POS" type="xs:NMTOKEN"
      use="optional"/>
  </xs:complexType>
</xs:element>
<xs:element name="Company" type="EcomSimpleText"/>
<xs:element name="Effective">
  <xs:complexType>
    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute ref="id" use="optional"/>
    <xs:attribute name="Day" type="xs:NMTOKEN"/>
    <xs:attribute name="Month" type="xs:NMTOKEN"/>
    <xs:attribute name="Year" type="xs:NMTOKEN"/>
  </xs:complexType>
</xs:element>
<xs:element name="Id">
  <xs:complexType>
    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute ref="id" use="optional"/>
    <xs:attribute name="CID" type="xs:NMTOKEN"
      use="optional"/>
    <xs:attribute name="Reference" type="xs:NMTOKEN"
      use="optional"/>
    <xs:attribute name="Acquire" type="xs:NMTOKEN"
      use="optional"/>
    <xs:attribute name="Forward" type="xs:NMTOKEN"
      use="optional"/>
  </xs:complexType>
</xs:element>
```



```
</xs:complexType>
</xs:element>
<xs:element name="Inquiry">
  <xs:complexType>
    <xs:simpleContent>
      <xs:extension base="xs:anyURI">
        <xs:attribute ref="Mode" use="optional"/>
        <xs:attribute ref="id" use="optional"/>
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>
</xs:element>
<xs:element name="Name">
  <xs:complexType>
    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute ref="id" use="optional"/>
    <xs:attribute name="Prefix" type="xs:NMTOKEN"
      use="optional"/>
    <xs:attribute name="First" type="xs:NMTOKEN"
      use="optional"/>
    <xs:attribute name="Middle" type="xs:NMTOKEN"
      use="optional"/>
    <xs:attribute name="Last" type="xs:NMTOKEN"
      use="optional"/>
    <xs:attribute name="Suffix" type="xs:NMTOKEN"
      use="optional"/>
  </xs:complexType>
</xs:element>
<xs:element name="Password" type="EcomSimpleText"/>
<xs:element name="PrivateUse" type="EcomSimpleText"/>
<xs:element name="Response" type="EcomSimpleText"/>
<xs:element name="Settle">
  <xs:complexType>
    <xs:attribute ref="Mode" use="optional"/>
    <xs:attribute ref="id" use="optional"/>
    <xs:attribute name="Day" type="xs:NMTOKEN"/>
    <xs:attribute name="Month" type="xs:NMTOKEN"/>
    <xs:attribute name="Year" type="xs:NMTOKEN"/>
  </xs:complexType>
</xs:element>
<xs:element name="Signature">
  <xs:complexType>
    <xs:simpleContent>
      <xs:extension base="xs:string">
        <xs:attribute ref="Mode" use="optional"/>
        <xs:attribute ref="id" use="optional"/>
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>
</xs:element>
```



```

    </xs:complexType>
  </xs:element>
  <xs:element name="StateProv" type="EcomSimpleText"/>
  <xs:element name="Street">
    <xs:complexType>
      <xs:attribute ref="Mode" use="optional"/>
      <xs:attribute ref="id" use="optional"/>
      <xs:attribute name="Line1"/>
      <xs:attribute name="Line2" use="optional"/>
      <xs:attribute name="Line3" use="optional"/>
    </xs:complexType>
  </xs:element>
  <xs:element name="Trace" type="EcomSimpleText"/>
  <xs:element name="Track1" type="EcomSimpleText"/>
  <xs:element name="Track2" type="EcomSimpleText"/>
  <xs:element name="TransactionComplete">
    <xs:complexType/>
  </xs:element>
  <xs:element name="UserID" type="EcomSimpleText"/>

</xs:schema>

```

3. Usage Notes for ECML v2

This section provides a general usage guide for ECML v2.

3.1. Presentation of the Fields

ECML v2 merely names fields and specifies their content and hierarchical organization. It does not constrain the order or completeness of communication of or query for these fields.

Some parties may wish to provide or ask for more information, and some for less by omitting fields. Some may ask for the information they want in one interaction or web page, and others may ask for parts of the information at different times in multiple interactions or different web pages. For example, it is common to ask for "ship to" information earlier so that the shipping cost can be computed before the payment method information. Some parties may require that all the information they request be provided whereas others may make much of the information optional. Other variations are likely.

Every element may be flagged as a query or assertion by including, when XML syntax is in use, the optional Mode attribute with the value "Query" or "Assert" respectively. The Mode attribute effects all descendant elements until overridden by a lower level element with a Mode attribute. Thus it is easy to indicate that all of the elements in an ECML v2 structure are present as queries or assertions.

Query elements may have data content. Such content SHOULD be interpreted as a default value to be returned if no better value is known.

There is no way with Version 2.0 of ECML to indicate what query fields a party considers mandatory to be answered. From this point of view, all fields queried are optional to complete. However, a party may give an error or re-present a request for information if some field it requires is not completed, just as it may if a field is completed in a manner that it considers erroneous.

3.2. Methods and Flow of Setting the Fields

A variety of methods of communication is possible between the parties by which each can indicate what fields it wants the other to provide. Probably the easiest method for currently deployed mass software is through fields in an [HTML] form. Other possibilities include using an [XML] exchange, the IOTP Authenticate transaction [RFC2801], or proprietary protocols.

So that browser software can tell what version it is dealing with, it is REQUIRED that the Ecom_SchemaVersion field be included in every transaction when ECML is being used on the web. Ecom_SchemaVersion SHOULD appear on every web page that has any Ecom fields. It is usually a hidden field in HTML Forms.

User action or the appearance of the Ecom_SchemaVersion field are examples of triggers that can be used to initiate a facility capable of providing information in response to an ECML-based query or of using information from ECML assertions. Because some web software may require user activation, it is RECOMMENDED that there be at least one user-visible Ecom field on every web page with any Ecom fields present when ECML is used via the web.

Under some circumstances, communications can proceed very slowly, so it may not be clear to an automated processing function when it is finished receiving ECML fields on a web page or the like. For this reason, it is RECOMMENDED that the Ecom_SchemaVersion field be the last Ecom field on a web page.

Transfer or requests for information can extend over several interactions or web pages. Without further provision, a facility could either require re-starting on each page or possibly violate or appear to violate privacy by continuing to provide personal data beyond the end of the transaction with a particular business. For this reason, the Ecom_TransactionComplete field, which is normally hidden when it is part of an HTML Form, is provided. It is RECOMMENDED that it appear on the last interaction or web page

involved in a transaction, just before an Ecom_SchemaVersion field, so that multi-interaction automated logic receives a hint as to when to stop if it chooses to check for this field.

4. Security and Privacy Considerations

The information called for by many of these fields is sensitive. It should be protected from unauthorized modification and kept confidential if it is stored in a location or transmitted over a channel where it might otherwise be observed. In addition, the authenticity of the information will be a concern in many systems.

Mechanisms for such protection and authentication are not specified herein but might, depending on circumstances, include object security protocols (such as XMLDSIG [RFC3275], XML encryption [XMLENC], or CMS [RFC3852]), or channel security (such as TLS [RFC2246] or IPSec [RFC2411]). Systems in which an ECML field or fields are stored and later forwarded will likely find object security the most appropriate.

When information is being requested from a user, the user's control over the release of such information is needed to protect the user's privacy.

Software that is installed on shared or public terminals should be configurable so that memory of any sensitive or individual identity information is fully disabled. This is vital to protect the privacy of library patrons, students, and customers using public terminals, and of children who might, for example, use a form on a public terminal without realizing that their information is being stored.

When sensitive or individual identification information is stored, the operator or user should have an option to protect the information; for example, with a password without which the information will be unavailable, even to someone who has access to the file(s) in which it is being stored.

Any multi-page/screen or other multi-aggregate field fill-in or data provision mechanism SHOULD check for the Ecom_TransactionComplete field and cease automated fill when it is encountered until fill is further authorized.

It should be remembered that default, hidden, and other values transferred to another party may be maliciously modified before being returned.

5. IANA Considerations

The sections below provide for:

1. registration of the ECML v2 XML schema contained in this document,
2. a version URN for ECML versions,
3. the subsidiary registration of particular ECML versions and the specific registration of Version 2.0, and
4. three additional IANA registries for elements appearing in three ECML v2 fields.

5.1. ECML v2 Schema Template

The ECML v2 schema give in Section 2.2.2 above is registered as follows:

URI: urn:ietf:params:xml:schema:ECMLv2

Registrant Contact: The IESG <iesg@ietf.org>

XML: The XML Schema in Section 2.2.2 above.

5.2. ECML v2 URN Template

As specified by the template below from [RFC3553], urn:ietf:params:ecml is permanently registered with sub-registration via RFC publication.

Registry name: urn:ietf:params:ecml

Specification: RFC 4112

Repository: RFC 4112

Index value: Values subordinate to urn:ietf:params:ecml are registered by RFC publication. As provided in [RFC3553], once such a value is registered, it may never change.

5.2.1. Sub-registration of v2.0

The subordinate value "v2.0" is hereby permanently registered so that the URN

urn:ietf:params:ecml:v2.0

is used to indicate an ECML field or fields that conform to this specification. Although it is not anticipated that deeper values subordinate to this URN will need to be registered, if necessary, they are registered by IESG approval.

5.3. IANA Registries

There are three fields described in Section 2.1.2 that require the establishment of IANA registries as described below:

Ecom_Payment_Card_Type

A registry of case-insensitive alphanumeric ASCII [ASCII] card-type designations from one to four characters in length with no white space. See Section 2.1.2, Note 11, for the initial 12 designations. Designations are added based on expert approval. Applicants for registration will normally be required already to have an ISO Issuer Identification Number (IIN) or set of IINs.

Ecom_Payment_Card_Protocol

This field holds a space-separated list of protocols designated by case-insensitive alphanumeric ASCII [ASCII] tokens from this registry or holds the token "none". See Section 2.1.2, note 17, for the initial seven registered tokens (including "none") and further information. Tokens are added to the registry based on expert approval.

Ecom_Transaction_Type

A case-insensitive alphabetic ASCII [ASCII] value indicating the type of transaction. See Section 2.1.2, note 30, for the initial two registered values. Values are added based on expert approval.

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A. Appendix: Changes from v1.1 to v2

Substantial rewording of text to change the emphasis from HTML Form Fields to XML Syntax.

Addition of the merchant -> processor fields.

Addition of the Ecom_Wallet_Location and Ecom_User_Certificate_URL fields.

Addition of the "Mode" attribute.

Addition of the ECom_Payment_Card_IssueNumber, Loyalty Card fields, Device ID, Valid From, and User Data fields.

Addition of an XML schema.

Some minor fixes related to telephone numbers.

Addition of IANA Considerations section.

Updating of RFC references for obsoleted RFCs.

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