

Framework for energy market communications —

Part 101: General guidelines

ICS 33.200

National foreword

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Cross-references

The British Standards which implement international publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

Summary of pages

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TECHNICAL REPORT

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Framework for energy market communications – Part 101: General guidelines



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INTRODUCTION

With the transition of monopoly energy supply structures to deregulated energy markets, the function of the markets depends heavily on seamless e-business communication between market participants. Compared with global e-business, e-business in the energy market is only a small niche. Today, UN/EDIFACT or ANSI ASC X12 messages, or proprietary HTML and XML solutions based on Internet technologies are being used. With the advent of new e-business technologies such as ebXML by UN/CEFACT (United Nations / Centre for Trade and Electronic Business) together with OASIS (Organization for the Advancement of Structured Information Standards), and Web Services by W3C (World Wide Web Consortium) and OASIS based on Internet technologies, an energy market specific profile of these standards can be used for regional energy markets. These profiles allow the re-use of proven core components and communication platforms across markets, thus saving cost and implementation time. Because some of these technologies are still under development, other technologies or converged technologies are not excluded for the future.

The IEC 62325 series includes, besides general requirements and guidelines, the business operational view with profiles of technical e-business communication architectures together with migration scenarios. The process and information model as well the abstract service model is not included in the first edition of the IEC 62325 series but may be added in the future. It does not itself define standards and only references available standards.

It supports the communication aspects of all e-business applications in deregulated energy markets with emphasis on system operators. The business operational view includes the market communication aspects of system operator applications with interfaces to other market participants from trading over supply to balancing planned generation and consumption, change of supplier, market services and billing.

The 'process' real-time communication of energy systems is beyond the scope of the IEC 62325 series.

The IEC 62325 series is subject to legal and security aspects of e-business and energy market rules that may be different from country to country or region to region.

It is important to note that the IEC 62325 series specifies no "content" (market model with processes, collaborations, transactions, messages, core components) because energy markets still vary. The specific content modelling of regional markets is subject of regional projects and/or may be candidate for future standardisation extending the IEC 62325 series. But methods and tools of modelling are described and in part 102 non-normative examples of core models, processes and messages, which show how the IEC 62325 series might be used.

Note that work is in progress at UN/CEFACT regarding the "content" of business information exchange for example as Core Components (UN/CEFACT – Core Components Technical Specification), Core Component Library (CCL, accessible through an registry/repository), Catalogue of Core Components (including industry groups), Common Business Processes, UMM Business Library, XML message design rules (UN/CEFACT – XML Naming and Design Rules (Draft 2004)).

The energy market specific vocabulary can be derived from Core Components or/and a knowledge based energy market information model (for example the so called CIM market extension of the CIM Common Information Model (IEC 61970-301)).

Whereas IEC 62325-501 and IEC 62325-502 of the current IEC 62325 series edition are restricted to the use of the ebXML technology, the planned technical parts are intended to convert the framework into a more open framework taking into account also other e-business technologies besides ebXML, as Web Services with future IEC 62325-6XX. This may also include with future IEC 62325-401 an abstraction service model with mapping to the various e-business technologies (future IEC 62325-503, and future IEC 62325-603) to hide the e-business technology actually used from the application.

FRAMEWORK FOR ENERGY MARKET COMMUNICATIONS –

Part 101: General guidelines

1 Scope

This part of IEC 62325 gives *technology independent* general guidelines applicable for e-business in energy markets based on Internet technologies providing:

- a description of the energy market specific environment;
- a description of the energy market specify requirements for e-business;
- an example of the energy market structure;
- an introduction to the modelling methodology;
- network configuration examples;
- a general assessment of communication security.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

2.1 Generic Open-edi standards

The IEC 62325 series is based on ISO/IEC 14662 and Internet technologies, notably on XML (Extensible Markup Language) of the W3C (Word Wide Web Consortium) with references to existing or emerging standards or de-facto standards for global e-business.

IEC 60870-6 (all parts), *Telecontrol equipment and systems – Part 6: Telecontrol protocols compatible with ISO standards and ITU-T recommendations*

IEC 61968 (all parts), *Application integration at electric utilities – System interfaces for distribution management*

IEC 61970 (all parts), *Energy management system application program interface (EMS-API)*

IEC 62210, *Power system control and associated communications – Data and communication security*

ISO/IEC 14662, *Information technology – Open-edi reference model*

ANSI ASC X12, Release 4040, December 2000

UN/EDIFACT, D.01A Directory, January 2001

UN/CEFACT *Modelling Methodology (UMM)*, NO90 R12 or higher

UN/CEFACT *Meta Model*, NO90 R10 or higher

UN/CEFACT XML Naming and Design Rules, draft 2004⁴

UN/CEFACT Core Components Technical Specification

In this part of IEC 62325, RFCs (Request For Comments) from the Internet Engineering Task Force (IETF) and recommendations from other Organisations such as the World Wide Web Consortium (W3C) and the Organization for the Advancement of Structured Information Standards (OASIS) are mentioned which are not included here because these documents are referred to in the references above.

2.2 Sectorial Open-edition standards

Market modelling based on this implies to some extent sectorial standards. At the moment no references are given.

3 Terms, definitions and abbreviations

3.1 Terms and definitions

None.

3.2 Abbreviations

A2A	Application-to-Application
AES	Advanced Encryption Standard
B2B	Business-to-Business
BDS	Business Document Specification (instance)
BDSS	Business Document Specification Schema
BIE	Business Information Entity
BOV	Business Operational View
BPMS	Business Process Management System
BPSS	Business Process Specification Schema (or instance)
BSI	Business Service Interface
CC	Core Component (based on BIE)
CIM	Common Information Model
CPA	Collaboration Protocol Agreement
CPP	Collaboration Protocol Profile
DSO	Distribution System Operator (of power system)
DUNS	Data Universal Numbering System (North America)
EAN	European Article Number (Europe)
ebXML	electronic business XML
EDI	Electronic Data Exchange
EIA	Enterprise Application Integration
EMS	Energy Management Systems
ERP	Enterprise Resource Planning
FOV	Functional Service View
FTP	File Transfer Protocol

⁴ Under consideration.

HTTP	Hypertext Transport Protocol
ICT	Information and Communication Technology
ISO	Independent System Operator
IT	Information Technology
MIME	Secure/Multipurpose Internet Mail Extensions
MIS	Market Identification Schema
MOM	Message-oriented middleware
MSH	Message Service Handler
PKI	Public Key Infrastructure
QoS	Quality of Service
RPC	Remote Procedure Call
RR	Registry / Repository
SAML	Security Assertion Mark-up Language
SCADA	Supervision, Control, and Data Acquisition
SMTP	Simple Mail Transfer Protocol
SO	System Operator (of power system)
SOAP	Simple Object Access Protocol
TLS	Transport Layer Security
TSO	Transmission System Operator (of power system)
UML	Unified Modelling Language
UMM	UN/CEFACT Modelling Methodology
VPN	Virtual Private Network
WS	Web Services
WSDL	Web Services Definition Language
XML	eXtensible Markup Language
XKMS	XML Key Management Specification.

4 Energy market requirements

4.1 Communication and data networks

Many market participants need to communicate with each other in the energy market. In the IEC 62325 series, it is assumed that e-business in energy markets makes use of Internet, which is public, unreliable and insecure in a reliable and secure manner (see Figure 1).

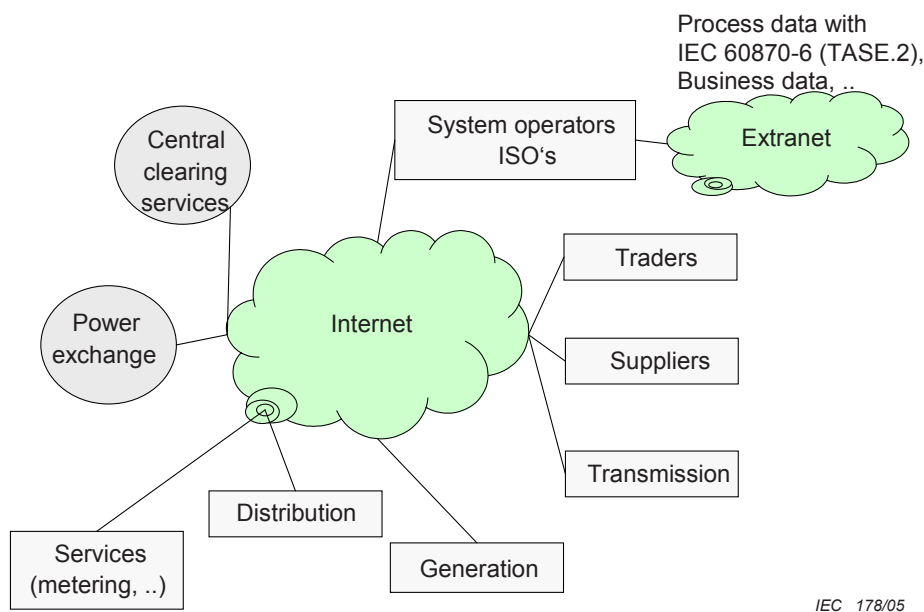


Figure 1 – Energy market communication over the Internet

Within the market, other types of networks besides the Internet also are possible by agreement, as shown by Table 1.

Table 1 – Type of data networks

Network	Features	Remark
Internet	Cheap, unreliable, insecure	Public
Virtual private network (VPN)	Secure logical network in the Internet	Uses the Internet in a closed user group for trusted partners
Extranet	Private physically separated network	For trusted partners

It is important to note that the relationship of market participants for communication purposes follows more the ‘one-to-many’ then the general ‘any-to-any’ pattern. For example transmission system operators and power exchanges have a ‘one-to-many’ relationship to traders. Clearing service providers, for example for change of suppliers, have a one-to-many relationship to distribution service providers and suppliers. Energy brokers providing trading information do not trade themselves and have a ‘one-to-many’ relationship with traders. From this point of view, it is natural that the communication hubs at the “one-to” end of the relationship are responsible in order to define the business communication interfaces for the corresponding market participants in a harmonised and standardized fashion, based on an agreed technology. Because e-business technologies are positioned for global e-business of any business, including discovery of *a priori* unknown business partners, the many options of this technologies should be reduced to a minimal profile that satisfies the requirements.

4.2 Business areas and processes

In the energy market, energy is generated (electricity) or produced (gas), traded (wholesale) and supplied (retail) to the customer (consumption). At every moment, generation and supply should be in balance and the security of the energy network should be granted. Producers and customer have non-discriminatory access to the energy network and customers can chose their supplier in a deregulated market. The commercial use of energy networks for transmission and distribution is transparent to the market participants regardless of the physical structure (voltage level, hierarchy, control areas involved). The market also needs services to support the core functions such as registration of market participants and network access, change of supplier, relocation of customers, metering and collection of metering data, settlement of accounts, and billing.

Figure 2 shows a high-level presentation of the supply chain of energy with basically three main phases: In the *trading planning phase*, energy consumption is forecast and trading is planned. In the *trading operational phase*, energy is traded to meet the forecast, and respective generation resources are allocated. The implementation of the physical energy path from generation over the transmission and distribution network to consumption affords co-ordinated planning of balanced schedules in the *system operation planning phase* for generation, import/export and consumption. In the *system operation operational phase*, energy flows directly from the producer to the customer over the transmission and distribution network. System operation guarantees that in this phase, generation meets consumption in real-time (balancing) and that the system is reliable. Many services are needed to support the core processes. In the *settlement phase*, for example, the settlement service provides the means to bill consumption and imbalances. Any imbalance of operation (difference between schedules and metered generation and consumption) is in the financial responsibility of the Balance-Responsible Parties (traders and others).

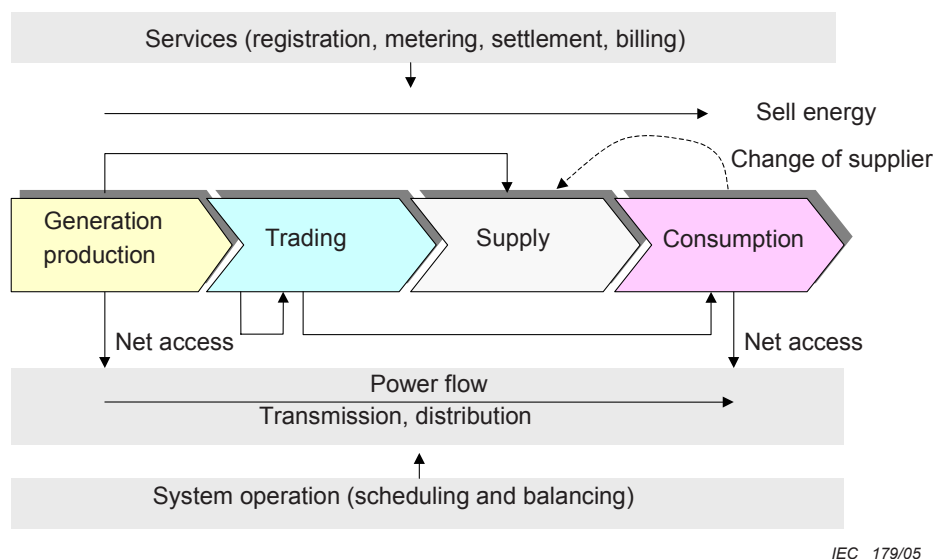


Figure 2 – Energy supply chain

Table 2 identifies the business areas, processes within the areas and the involved roles of market participants. For an informative *simplified market model* which serves only for the purpose of giving a specific context to e-business in energy markets refer to IEC 62325-102. The nomenclature may change from market to market. Some business processes are identified as energy services to indicate that these processes could be outsourced to service providers. In addition to suppliers, sub-suppliers also exist as aggregators (aggregation of consumption), but are not included.

It is important to note that where reference is made to ‘market participants’, this should be understood to mean ‘market participant roles’ rather than market participants in the sense of companies. This is because a market participant can take on many roles. For example, a distribution utility can take on the roles of distribution system operator (network control), distribution service provider (network planning, construction and maintenance), supplier (buying and selling energy to end consumers), energy service provider (registration, change of supplier, metering, settlement of accounts, billing), within the constraints of a particular regulatory system.

Table 2 – Business areas, processes and market participants

Business area	Business process	Roles of involved market participants
Generation		
	Generation planning	Generator
Trading		
	Bilateral trading	Trader, central matching service provider (confirmation)
	Brokering	Trader, Broker
	Bidding at power exchange	Trader, Power exchange
	Financial clearing	Trader, clearing responsible parties
	Auxiliary services trading	Trader, transmission system operator
	Cross boarder auctioning	Trader, transmission system operator
Supply		
	Selling energy to end consumers	Supplier
Transmission		
	Registration, network access and transmission	Transmission system operator, transmission service provider, generators, customers
Distribution		
	Registration, network access and distribution	Distribution system operator, distribution service provider, generators, customers
System operation		
	Scheduling consumption and generation	Transmission system operator, balance responsible parties (trader, supplier, generator)
	Scheduling import/export	Transmission system operator, balance responsible parties (trader)
	Operation (Balancing)	Transmission System operator, generators (auxiliary services)
Energy services		Service provider, etc. many market participants
	Metering (meter readings)	Customer, distribution service provider, metering service provider
	Access to collected metering data	Supplier, trader, metering service provider
	Settlement of accounts of consumption and generation	Service provider, supplier, generator, etc.
	Settlement of accounts of imbalance	Transmission system operator, balance responsible parties (trader, supplier, generators), service provider
	Billing	Service provider, etc.
	Change of supplier	Customer, supplier, distribution service provider
	Relocation of customer	Customer, supplier, distribution service provider
	Exchange of market metadata	Customer, supplier, distribution service provider