Appendix 1

to Business Terms of OTE, a.s. for the Power Sector

Revision 36 – JuneMay 20242

XML MESSAGING FORMATS

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LIST OF SCHEMES

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1. USED ACRONYMS

Acronyms and definitions used in Business Terms of OTE, a.s. for the Power Sector apply for this document. In addition, the following acronyms are used:

Acronym	Definition
AMQP	Advanced Message Queuing Protocol, a standard defining data exchange through messages for the communication server RabbitMQ
ČEPS	ČEPS, a.s., Operator of the Transmission System of the Czech Republic
CIM	Common Information Model
CS	Communication Server CS OTE
ČHMÚ	Czech Hydrometeorologic Institute
	Day-Ahead Electricity Market
DUF	Supplementary data for invoicing power distribution
BA	Bilateral Agreement, a tool for execution of bilateral transactions under the Market Rules; bilateral agreements are filed in CS OTE through registered realization diagrams
EAN	International Article Number, a global system of barcoding and identification of goods, services and organizations
ENTSO-E	The European Network of Transmission System Operators for Electricity, is the association for the cooperation of the European transmission system operators (TSOs)
EMO	External Market Organizer (such as Power Exchange Central Europe, a.s.)
RRD	Registered Realization Diagram in CS OTE (bilateral agreements, Exchange trade, supply according to fixed diagrams, cross-border trade)
GLN	Global Location Number – used for identification of physical locations or legal entities within logistical chain
GMT	Greenwich Mean Time
IDA	Intraday Auction
IS OTE	Information System of the Market Operator, part of CS OTE (without CDS)
ISO	International Organization for Standardization
IS-U	Industry Specific Solution of the SAP Information System for Utilities Industry
ST/WT	Summer / Winter Time
MC	Monthly Settlement / Monthly Clearing
OKTE	OKTE, a.s., Short-Term Electricity Market Organizer in Slovakia
PKI	Public Key Infrastructure
SEPS	SEPS, a.s., Operator of the Transmission System in Slovakia
SFVOT	CS OTE module used for financial security and settlement/clearing of electricity and gas market participants
UI	User Interface
IM	Continuous Intra-Day Electricity Market
XSD	XML Schema Definition
FMC/FC	Final Monthly Settlement / Final Monthly Clearing

2. INTRODUCTION

This document aims to describe the governing rules for all CS OTE users. The rules are binding for all CS OTE users.

The CS OTE communication server ensures centrally communication with the other parts of the central system and provides support for processes related to the electricity market in the following fields:

- o registration of electricity market participants
- o registration of PDT (core records)
- o registration of imbalance responsibility
- o change of supplier
- o registration/recording of realization diagrams
- o short-term markets (DM, IM, IDA) and provision of trading results
- o gathering preliminary and metered data and data aggregation
- o calculation of substitute values using LP
- o calculation of imbalances (daily, monthly and final monthly version)
- o financial security
- o determination of and change in FS limit for IM
- o financial settlement (daily, monthly and final monthly)
- o data collection and provision for billing traders for electricity supply and distribution, including transfer of electronic invoices between DSO and electricity suppliers
- o claims and provision of information
- o registration and provision of trade data

trade data reporting

The principles of secure access to data using PKI technology and electronic signature have been applied across the entire CS OTE infrastructure.

Documents describing in detail communication between electricity market participants and CS OTE are posted on OTE's public website as follows:

- "D1.4.2 XML Messaging Formats - Electricity" and "XSD Templates" and "ETSO CIM Templates"

    The first document specifies the structure of XML messages (schemas) and defines particular services or transactions directly in relation to the nature of transferred data; it comprises complete files in .xsd / schema (*.XSD), including references to specific examples; the XSD and ETSO CIM templates are schemas describing permissible contents of the document, e.g. a document in a "XSD template comprises global XSD templates (data types common for all or most formats), including message schemas OTE_ GLOBALS (comprising data types common for all or most formats) and XMLDSIG-CORE-SCHEMA (comprising electronic signature definition).

- "D1.4.3 CS OTE Web Services Interface" and "WSDL Templates"
    The first document is a manual for using the interface of CS OTE web services for the power sector. It comprises, among others, description of communication channels; WSDL template is the standard template for description of web services interface ensuring communication between CS OTE and external market participants' platforms.

- "D1.4.4 CS OTE Automatic Communication Interface"
  The document is a manual for using automatic communication interface, describing the concept of CS OTE security and the methods of automated exchange of information between external entities and CS OTE. In addition, the document comprises description of the application of XML-based format standards under ETSO specification and modified messages for communication in the field of realization diagram records, including description of scenarios of such messages.

- "D1.4 CS OTE External Interface – Message Formats for IM Markets"
  The document describes for external participants linking OTE's new IM markets to their systems through the AMQP server, including the structures of specific XML messages and communication scenarios.

The aforementioned documents may change on the basis of amendments to applicable legislation and on the basis of immediate needs of markets participants. If any of the foregoing documents is updated, OTE shall post the updates on OTE's website at least one month before the relevant updates come into effect for a minimum of 10 business days so that market participants' can contribute their comments, whereas all market participants and ERO are notified about the changes. The final version of the document is also posted for market participants for 10 business days prior to implementing the changes in the OTE system.

3. RULES OF COMMUNICATION

OTE, a.s. in its role of electricity market operator maintains communication with market participants in the following fields:

Market participant	Information provided
Transmission system operator	• PDT registration • Metered data on electricity consumption and production in TS • Data on PpS (RE), incl. data on electricity acquired abroad and electricity for the needs of re-dispatching • Inputs (approval) in the change of supplier process • Records of realization diagrams – cross-border trade • Sending cross-border profile capacity for DM and IDA
Distribution system operator	• Metered data on electricity consumption and production in DS • PDT registration • Inputs (approval) in the change of supplier process
Balance Responsible Party	• Records of realization diagrams • Gathering information on settlement results • Inputs (approval) in the change of supplier process • Registration of imbalance responsibility • Obtaining documentation for OTE's financial settlement
Short-term market participant	• Bids on organized short-term markets • Gathering information on results of trading on organized short-term markets • Registration and provision of trade data • Trade data reporting
Registered market participant – electricity supplier (with SS's consent)	• Initiation and inputs in the change of supplier process • Gathering data for billing customers for electricity • Registration of imbalance responsibility • Records of realization diagrams – supply based on fixed diagram
Registered market participant – RE provider (with BRP's consent)	• Access to metered data on RE

In addition, CS OTE communicates with the following entities:

LP administrator	• Submission of updated LP values • Collection of statistical data on LP application
ČHMU	• Submission of weather data (for LP application)
PXE (Power Exchange Central Europe, a.s.)	• Records of realization diagrams – exchange trading • Instructions for DM on behalf of BRP for the purpose of physical settlement of futures contracts with financial settlement

ACER	• Trade data reporting
~~EPEX~~	• ~~4M MC~~

Data between OTE and market participants are transferred via:

- **Web interactive interface,**
  where participants access OTE's secure website through which they can send data and obtain the results of processes supported by CS OTE, and access IM markets through an application.
- **Automatic communication,**
  where participants submit and receive data through the SOAP automatic communication system allowing for connecting the market participant with the CS OTE communication server; all data is transferred in agreed upon standardized formats using two-way HTTPS connection, access IM markets through AMQP-supporting platform, or through the SMTP channel for two-way transfer of messages via electronic mail.

For any communication with CS OTE, communication scenarios are defined.

The CS OTE communication server uses for secure communication uniform PKI infrastructures across the entire CS OTE system to centrally control access of all users regardless of whether they are CDS users or IS OTE users. A more detailed description of the security concept, including description of the process of transferring messages with electronic invoices, is included in the document "D1.4.3 CS OTE Web Services Interface".

Each type of message is uniquely identified. For all messages of the given format sent via external interface of the CS OTE system, the transferring and receiving system is defined, in addition to the unique identification. The list of all messages is included in documents "D1.4.2 XML Messaging Formats – Electricity" and "D1.4 CS OTE External Interface – Message Formats for IM Markets".
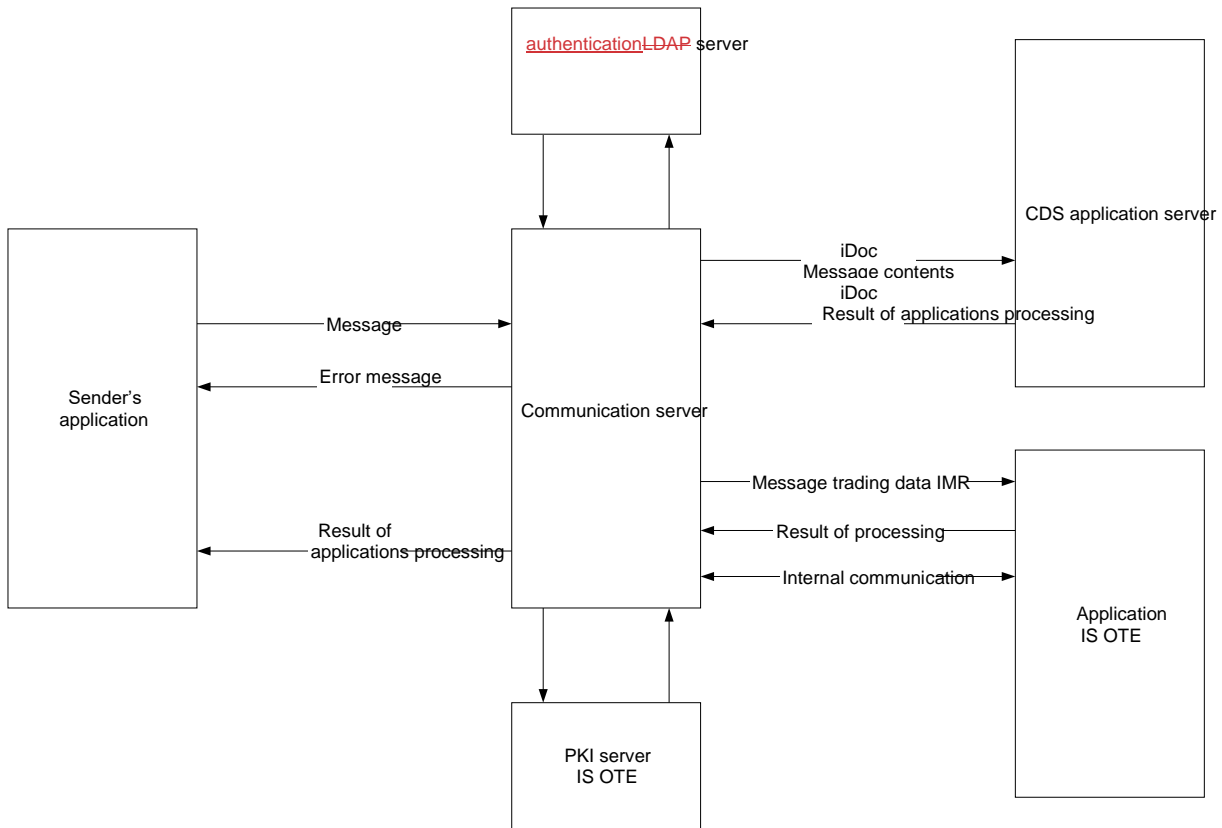
The CS OTE uses for communication the following messaging formats:

- o **XML** – includes standards as follows:
    - Standard under E<u>N</u>TSO<u>-E</u> specification – standard defined by the ENTSO<u>-</u>E organization
    - Standard under OTE specification – standard defined by OTE

- o **XML for AMQP communication –** standard according to ~~Rabbit MQ~~ <u>a</u> specifications <u>of OTE for AMQP communication</u>

Messaging between market participants' systems is automated and takes place in line with the principal rule in the following steps:

1. the market participant sends a message to CS OTE; the message may contain either particular data for processing in CS OTE or, conversely, a request to receive data from CS OTE;

2. the message is received through the CS OTE communication server; the sender's electronic signature is verified against CS OTE ~~LDAP~~ <u>authentication</u> server and PKI server decodes the message;

3. the CS OTE communication server checks the message syntax; in the event an error is detected in the previous steps a system error report is sent;

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4. in the event the check finds no errors, the CS OTE communication server passes the message on to the respective application server of CS OTE for additional processing;

5. the application server processes the data and returns the result of such processing;

6. the CS OTE communication server encodes the response and signs and sends it back through the selected channel to the defined address.

authenticationLDAP server

CDS application server

iDoc
Message contents
iDoc
Result of applications processing

Message

Error message

Sender's application

Communication server

Result of applications processing

Message trading data IMR

Result of processing

Internal communication

Application IS OTE

PKI server IS OTE

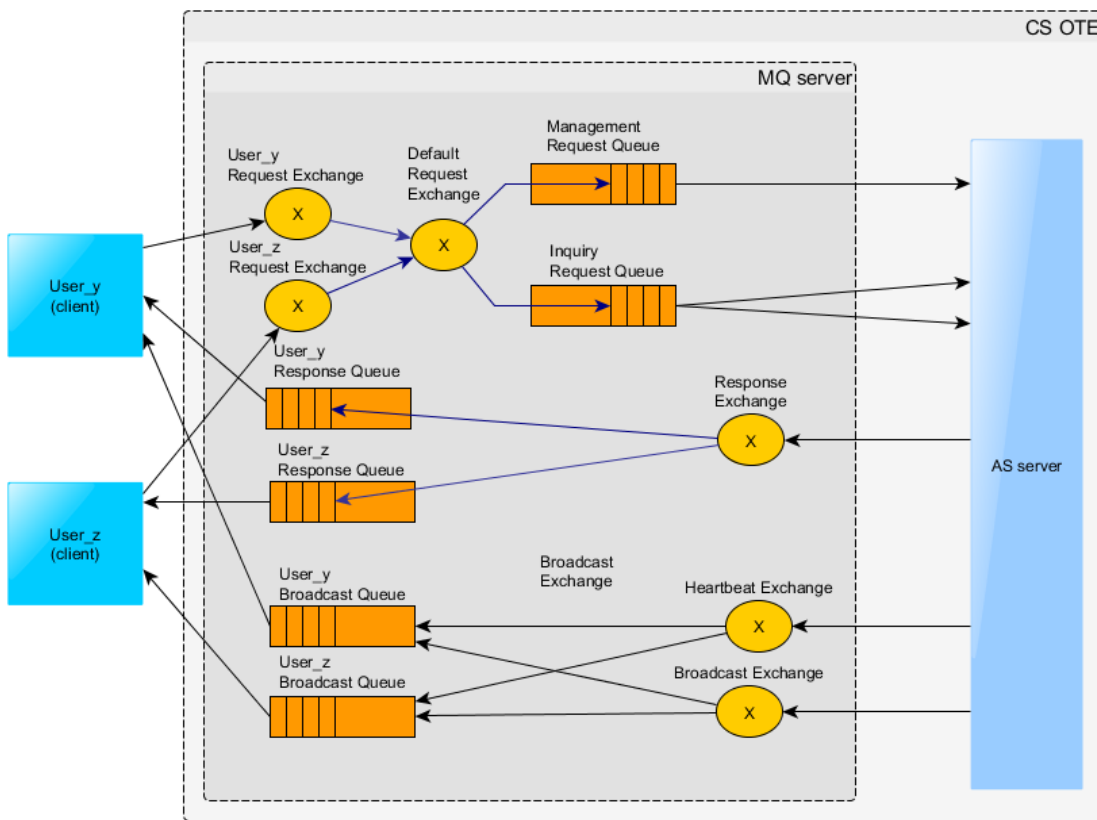**Scheme – Basic principle of message exchangeging**

Image – Communication with MQ server and message flow architecture

Data exchange is based on XML formats. Upon receipt of data in CS OTE, the message sender is verified to match the currently authenticated user. XML structures serve as the basis for WSDL documents used for particular services related to communication through SOAP v 1.1 protocol, the SOAP Document type, and through RabbitMQ server, ~~3.6.x version~~. Complete definitions of services are available on the communication server. In responding to a SOAP request comprising the respective XML structure, a return_code is transmitted with the following meaning:

- 0 – data received without error and internal document filed
- 1 – signature verification error
- 2 – transformation error
- 3 – internal document filing error

In addition to IM modules, the S/MIME SMTP protocol can be used as a back-up method of communication with CS OTE. Data must be attached as an e-mail message attachment secured according to S/MIME. The procedure of creating a S/MIME message for CS OTE is also described in document "D1.4.2 XML Messaging Formats – Electricity".

For date and time formats it applies that

- o date and time are entered in local time (for all messages except messages for BA, DM, IDA and IM)
- o date and time are entered in UTC (only for message for BA, DM, IDA and IM)
- o periods are marked with the time of the beginning and end of the particular period

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Date and time entered in local time

The header of an XML message in DATA format always contains in the *date-time* attribute the date and time of the message in YYYY-MM-DDTHH:MM:SS format, or YYYY-MM-DDTHH:MM:SS+HH:MM format, including an off-set showing the difference between the message date and time and GMT (for data filed in ST it applies that the time-offset=+02:00, for data filed in WT it applies that the time-offset=+01:00); if no off-set is entered, the input value is interpreted as GMT.

Date and time entered in UTC

Date entries are defined as "DateTime" types. The format of these entries in XML messages is YYYY-MM-DDThh:mm:ssZ, where Z marks the zero time zone (UTC).

Periods entered in local time

For interval data, the beginning of the day is defined as 00:00:00 hours, the end of the day as 00:00 hours of the following day.

The last hour of the day is defined in the following format: 2011-10-27T23:00/2011-10-28T00:00.

For non-interval data, date attributes have the following meaning:

- o data from – date from incl. (YYY-MM-DDT00:00)
- o data to – date to incl. (YYY-MM-DDT23:59)
- o all day 2011-10-27T00:00/2011-10-27T23:59

Periods entered in UTC

For interval data it applies that

- o start of day defined as YYYY-MM-DDT23:00Z (or YYYY-MM-DDT22:00Z in case of CEST) where DD corresponding to the previous day, e.g. for delivery day 11.2.2023 start of day is defined as 2022-02-10T23 :00Z,
- o • end of day as YYYY-MM-DDT23:00Z (or YYYY-MM-DDT22:00Z in the case of CEST), e.g. for delivery day 11.2.2023 the end of day is defined as 2022-02-111T23:00Z.

Numerical data

For numerical data it applies that

- o it is entered without spaces and separators of thousands, e.g.: 25000000
- o the separator of decimals is comma (.), e.g.: 3.14
- o incomplete notation is not permitted, e.g.: .5 or 2.
- o initial zeros are not permitted, e.g.: 02
- o positive values carry no sign, e.g.: 112
- o negative values always carry the minus (-) sign immediately before the first numeral, e.g.: -112
- o zero value may not carry any sign, e.g.: 0

4.   XML MESSAGING FORMATS

The communication server uses for communication the following XML messaging formats

- o   Standard under ETSO specification – standard defined by the ENTSO-E organization for communication in respect of recording realization diagrams and for communication between OTE – ČEPS

- o   Standard under OTE specification – standard defined by OTE

For the use of messaging in formats specified in document "D1.4.2 XML Messaging Formats – Electricity" rules apply as follows:

- o   Registered electricity market participants are marked by means of EAN-13 (GLN) coding; codes are allocated by OTE with the exception of identifiers under the ENTSO-E EIC standard for the needs of data exchange between OTE – ČEPS

- o   Points of delivery and transfer are marked by means of EAN-18 (GSRN) encoding; the codes are usually allocated by distribution system operators

- o   messages containing interval data must cover an entire day (24 hours, respectively 96 fifteen minute intervals – except for the switch from ST to WT and back)

- o   should any adjusted data need to be resent, the new message must contain all data of the original message; when processing the data, the previous message as a whole is not taken into account

- o   one data exchange (a data file with a message) must contain only one message

- o   all input messages serving to distribute instructions via the WAS portalCS for handling trading data are allocated a time identifier against which request validity assessment is performed (time of allocating the WAS server CS time depends on the type of channel through which the message was sent - HTTPs or SMTP or web interface for interactive work via user interface and the web browser)

4.1.   XML-based format standard under ENTSO-E specification in CIM standard

ENTSO-E formats are supported exactly in compliance with the standard CIM standards posted by ENTSO-E on its website (http://www.entsoe.eu). The only exception is Capacity_OTEMarketDocument report, where modifications have been made to cover the requirements of the electricity markets (DT and IDA). The only exception is Status Request, which was modified to meet the needs of the electricity market in the Czech Republic. Files containing ENSTO-E messages, examples of particular message formats, used code lists and global components are included in documents "D1.4.2 XML Messaging Formats - Electricity" and "D1.4.4 CS OTE Automatic Communication Interface".

For communication within DM and IDA the scope of coordination of day-ahead markets in the Czech and Slovak Republics XML-based messaging standards are used under the following ENTSO specification in CIM standards:

- o   **StatusRequest_MarketDocument** **ETSO Status Request Document** (ESR) in version 41.1 – for inquiry about MCC/determining MCC capacity data

- o   **ETSO Scheduling System** (ESS) in version 3.1

  - •   ETSO ESS Schedule Message – for sending reports of daily diagrams of cross-border transmissions carried out on DM to ČEPS

  - •   ETSO ESS Anomaly Report – for notification of the sender about discrepancies during processing of the relevant ETSO document

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- ~~ETSO ESS Confirmation Report – for notification of the sender about confirmed values during processing of the relevant ETSO document~~

o **Capacity_OTEMarketDocument**~~ETSO Capacity Allocation and Nomination (ECAN)~~ in version 8~~4.1~~0 - for an answer to request on capacity data

- ~~ETSO ECAN Capacity Document – for input of the current profile scope to meet the need for coordination of the day-ahead market or as a copy when inquiring about MCC capacity~~

- ~~ETSO ECAN Implicit Auction Result Document – for sending the results of the implicit auction to SEPS and ČEPS~~

o **Acknowledgement_MarketDocument**~~ETSO Acknowledgement Document (EAD)~~ in version 8~~5.1~~0 – for notification of the sender about the outcome of processing the relevant ENTSO-E document

For communication within the scope of recording realization diagrams XML-based messaging standards are used under the following ENTSO-E specification in CIM standards:

o **Schedule_MarketDocument** ~~ETSO Scheduling System (ESS)~~ in version 5~~3.2~~1 – e.g. for input of bilateral agreements (BA) through realization diagrams

o **Confirmation_MarketDocument** in version 5.3 – to inform the sender about the results of confirmed values of the realization diagrams.

o **AnomalyReport_MarketDocument** in version 5.2 – to inform the sender about the realization diagram inconsistencies,
~~o~~

o **Acknowledgement_MarketDocument**~~ETSO Acknowledgement Process~~ in version 8~~5~~.1– to inform the sender about the result of the processing of the given ENTSO-E document ~~0~~

o **StatusRequest_MarketDocument** ~~ETSO Status Request (Report) Document (ESR)~~ in version 4~~1~~.1 – ~~e.g.~~ for determining the realization diagram status

4.2.   XML-based format standard under OTE specification

For communication with CS OTE the following XML messaging formats are used:

- **CDSCLAIM** – serves for sending a request for filing / updating a claim, request for sending a copy of the claim, publishing information for market participants by the market operator,

- **CDSDATA** – serves for exchange of actual metered values and agreed upon values between market participants and CDS,

- **CDSIDIS** - serves for exchange of documentation for invoicing of distribution services between market participants and CDS,

- **CDSINVOICE**- serves for sending electronic invoices for DSO's distribution services to electricity trader, including advance payments,

- **CDSREQ**– serves for communication with CDS when submitting a request for data registered in CS OTE,

- **COMMONREQ** - serves for requesting data of asynchronously processed messages, for verification of connection with CDS (server-server) and for sending a request for transfer of unsent messages in IS OTE,

- **ISOTEDATA** – serves for exchange of data related to transactions in IS OTE ((intra-day electricity market, DM, IDA) between market participants (BRP) and CS OTE,

- **ISOTEREQ** – for requesting document / message related to IS OTE transactions (intra-day electricity market, DM, IDA ~~BA~~) between market participants (BRP) and CS OTE,

- **MASTERDATA** – serves for exchange of information about points of delivery between market participants and CDS; this message is used universally for separate steps of processing change of supplier; it has various functions defined by the functionality code in the message head,

- ~~**ISOTEMASTERDATA** – serves for sending the core data structure of IS OTE locations,~~

- **RESPONSE** – serves for confirmation of data exchange between market participants and CDS and IS OTE (IM, DM, IDA, BA),

- **TDD** (Load Profile) – serves for sending standardized LP from LP administrator to CDS,

- **TEMPERATURE** – serves for sending average daily temperatures and standard average daily temperatures from ČHMU to CDS,

- **SFVOTBILLING** – serves for sending financial reports / documents for invoicing from the SFVOT module,

- **SFVOTBILLINGEMO** – serves for sending reports for settlement between OTE and EOT,

- **SFVOTBILLINGSUM** – serves for sending financial reports / documents for invoicing with summary information for the inquired period (MC summary) from the SFVOT module,

- **SFVOTCLAIM** – serves for sending financial reports / overview of payments and claims from the SFVOT module,

- **SFVOTCLAIMSUM** – serves for sending financial reports from the SFVOT module – part Overview of payments and claims with summary information about final monthly settlement (FMC) for the inquired period,

- **SFVOTTDD** – serves for sending financial reports / clearing of LP differences from the SFVOT module – part LP Clearing,

- **SFVOTDTEXPIMP** – serves for sending daily deposits in the form of debit, credit and netting payment / report of offset receivables and liabilities,

- **SFVOTCONFDATA** – serves for sending an overview of daily deposits, both paid and due / report of confirmation of daily payments to OTE,

- **SFVOTEXCHRATE** – serves for sending OTE's settlement rate,

- **SFVOTLIMITS** – serves for sending information about SS's overall financial limit,

- **SFVOTTDDNETT** – serves for sending financial reports (netting LP) from the SFVOT module,

- **SFVOTREQ** – serves for requests for sending financial reports from SFVOT modules,

- **SFVOTSETTINGS** – serves for determining the FS limit on IM,

- **SFVOTLIMITCHANGE** – serves for notifications about change in FS limit on IM.

An overview of messages complete with their description and format, including the particular format structure, is part of documentation "D1.4.2 XML MessagingFormats – Electricity".

5. XML MESSAGING FORMATS ~~UNDER RABBIT MQ SPECIFICATION~~FOR AMQP COMUNICATION

The communication server Rabbit MQ communicates through the AMQP (Advanced Message Queuing Protocol). It is an open standard for the communication layer of applications working on the basis of data exchange through messages. Its implementation is performed through the MQ server RabbitMQ~~, version 3.6.x~~.

The first step is to establish a connection to the MQ server. A participant's relevant certificate registered in the CS OTE system is required to establish the connection.

Communication channels are created on the basis of the connection. These channels are linked with individual participants' "queues" serving for mutual communication between the client and the server.

For the Client – MQ server communication, two basic types of communication are used:

- **Request-Response)** – requests initiated by the client to which the MQ server responds asynchronously. The response is sent only to the communication initiator.
- **Mass Message (Broadcast)** – mass message distribution from the MQ server to clients. The distribution is performed on the basis of defined distribution rules and access rights. The system provides two basic types of mass messages:
  - Market data messages – messages about change in trade data and change in market status. Messages are distributed to all logged-in users who have requested permission for the relevant markets.
  - Heartbeat messages – messages for verification of active connection with the client.

The communication server MQ uses the following types of messages for communication with CS OTE:

- Login Request (LoginReq) – request to log into the system.

- User Report (UserRprt) – response to "Login Request"; it is also distributed for change in the configuration of the user's assignment to products.

- Logout Request (LogoutReq) - request to log the user out of the system.

- Logout Report (LogoutRprt) – message about a user logout from the system sent as a response to "Logout Request" or as a mass message due to a competitive login of the same user with forced login.

- Acknowledgement Response (AckResp) – message confirming receipt of an instruction for processing.

- Error Response (ErrResp) – error message distributed in case of an unsuccessful execution of an instruction/a request.

- Order Entry (OrdrEntry) – submission of one or more bids.

- Order Modify (OrdrModify) – message for a modification of one or more bids.

- Order Request (OrdrReq) – request for status of own bids.

- Order Execution Report (OrdrExeRprt) – message about a successful bid modification.

- Modify All Orders (ModifyAllOrdrs) – message for mass activation, deactivation and cancellation of bids.

- Public Order Books Request (PblcOrdrBooksReq) – request for notice board of the requested contract.

- Public Order Books Response (PblcOrdrBooksResp) – public information on current bids of the relevant contract. The message is distributed as a response to "Public Order Book Request".

- Public Order Books Delta Report (PblcOrdrBooksDeltaRprt) – message sent for a bid entry or an active bid change. The message contains all modified bids since the previous distribution of PblcOrdrBooksDeltaRprt for the relevant contract.

- Message Request (MsgReq) – request for trading system messages that were generated by the trading system in the past.

- Message Report (MsgRprt) – message from the trading system sent as a response to "Message Request" that are further distributed when a new message is generated in the trading system.

- Trade Capture Request (TradeCaptureReq) – request for own trades.

- Trade Capture Report (TradeCaptureRprt) – message about initiation of a trade sent to both parties to the trade; for each party only the respective part of the trade is filled. The message is also sent as a response to "Trade Capture Request".

- Public Trade Confirmation Request (PblcTradeConfReq) – request for public information on initiated trades.

- Public Trade Confirmation Report (PblcTradeConfRprt) – message about initiation of a trade. The message is distributed to all users assigned to the contract under which the trade was initiated. The message is also sent as a response to "Public Trade Confirmation Request".

- Contract Information Request (ContractInfoReq) – request for a contract.

- Contract Information Report (ContractInfoRprt) – information on contracts. The message is distributed in the event of change in a contract attribute or as a response to "Contract Information Request".

- Product Information Request (ProdInfoReq) – detailed information on a product as a response to "Product Information Request".

- Market State Request (MktStateReq) – current information about the market trading status. The message is distributed in the event of change in the market status and also as a response to "Market State Request".