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Clarity on capitalization of defined terms	Toby Considine	editorial		ENERGYINTEROP-741	Capitalization of defined terms should be more clear, and should be called out in section 1.4 Editing Conventions	12/Apr/22	RESOLVED	Correct capitalization and add note to Editing Conventions.
Include market characteristics for trading strategy development	William Cox	FACET MARKET	William Cox	ENERGYINTEROP-740	Certain market characteristics dictate aspects of trading strategy. For example, if the clearing use Double Auction approaches versus Order Book, the meaning and effect of low or negative bid differs. The set of Market Characteristics should be extended to enable realistic trading behavior and strategies.	23/Mar/22	RESOLVED	Include indication of all tenders for an instrument clearing at the same price (as in DA),
Should the delegation stuff be in the Privacy section in addition to the PartyID section?	Toby Considine	None	The language of a Delegate and thereby of a Delegate's ID is introduced in WD14 as being a Party other than the ultimate buyer or the ultimate seller whose ID MAY be used instead of the PartyID in tenders, quotes, and transactions. Should a discussion of the DelegateID be added to the privacy section?	ENERGYINTEROP-739		27/Apr/22	RESOLVED	Move to Privacy and rename - "Delegation" is a standard security term thus confusing. If a proxy ID is defined it MUST be the same type of and be a PartyID.
Alignment of Market Price Granularity and Stream Price Granularity	Toby Considine	CLARITY	Toby Considine - Editing Note	ENERGYINTEROP-738	In Streams, we defined Price Granularity as follows Stream Price Granularity Price granularity expressed as an exponent. Applies to all Intervals in the Stream. Not required for all Facets. For example, if the price granularity is -3, and the value is 1500, the price is 1.500 currency units. And in Market (Product) definition we have: Price Granularity PRICE_GRAIN The allowed price unit, e.g. Price Granularity == 10 means that that any multiple of 10 CURRENCY units is acceptable, but any price not matching, say a price of 9 CURRENCY units, is rejected. We need to make sure that we do not create confusion between these two definitions.	23/Mar/22	RESOLVED	Align description of market price granularity and scale with CTS streams.
Security & Privacy	Toby Considine	CLARITY OTHER	Horia Pop; Lateral Inc https://lists.oasis-open.org/archives/energyinterop-comment/202112/msg00001.html	ENERGYINTEROP-735	Security and Privacy Line 916 refers to encryption of messages using a lower case "should" whilst on line 985 the same encryption of messages is referred to with RFC uppercase MAY. This may inflict contradicting/vague recommendations in terms of message encryption. I suggest you use the same term for the use of encryption. I also believe that encryption, if not an absolute requirement, should be at least referred to with the word	22/Feb/22	RESOLVED	No action. Plan to rewrite Privacy section after Public Review 2.

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					SHOULD and RECOMMENDED as defined by RFC2119. The example on line 979 in reference to a distribution system operator does not seem to be related to either security or privacy. Line 988 is using a confusing statement format. Consider rephrasing for clarity "counterparty of the market" to "market as the counterparty". <i>[Lines 916,985,979,988]</i>			
Ticker Facet	Toby Considine	FACET	Horia Pop; Lateral Inc https://lists.oasis-open.org/archives/energyinterop-comment/202112/msg00001.html	ENERGYINTEROP-734	Ticker Facet The ticker should obfuscate the parties. The model should include for each instrument the last transaction quantity and price, direction of the price change since the previous transaction, price change value. Any request (or distribution for a ticker) should default to only the last transaction but historic (or time bounded) transactions could be returned for each instrument. The goal of the ticker is informative only. What is the purpose of the Cancel Ticker? <i>[Lines 744,756]</i>	12/Apr/22	RESOLVED	Rewrite Quote and Ticker Facets to address. Direction is a derived attribute with potential value added. Should not be included in Ticker Facet.
Quote Facet	Toby Considine	FACET	Horia Pop; Lateral Inc https://lists.oasis-open.org/archives/energyinterop-comment/202112/msg00001.html	ENERGYINTEROP-733	Quote Facet The facet payloads do not seem to provide a way for participants to ask for public market information for an instrument. i.e. What is the market price for 10kW at 11 AM tomorrow? The same information may be publicly distributed on price change, but a new actor that just joined the market should have a way to ask for that quote. What is the intended purpose for Cancel Quote payload?	12/Apr/22	RESOLVED	Delete CancelQuote, Add text on implicit pub-sub for ticker and quote; the transport may maintain some history or another actor can.
Tender Privacy	Toby Considine	PRIV-SEC	Horia Pop; Lateral Inc https://lists.oasis-open.org/archives/energyinterop-comment/202112/msg00001.html	ENERGYINTEROP-732	Tender Privacy The individual tenders and parties are indeed private information. But as with financial markets, there is public information derived from the tenders for each instrument. This should include the top of the book that can be an aggregation of multiple tenders (market price/cheapest sell price and quantity, highest buy price and quantity), market spread, and market depth. Is there any scenario in which TE will want to behave differently? Even if the current market price for an instrument is public it offers no guarantees. For a buy tender to match in both price and quantity (and possibly other aspects) the price will be higher than the market price. <i>[Lines 592, 745]</i>	12/Apr/22	RESOLVED	Update the Market Information Facet (Quote and Ticker) to reflect useful information for market participants. Section 13 WD17, This addresses privacy concerns as well.
Tender Payloads	Toby Considine	FACET RES-PROD-INSTR	Horia Pop; Lateral Inc https://lists.oasis-open.org/archives/energyinterop-comment/202112/msg00001.html	ENERGYINTEROP-729	Tender Facet à Payloads Definition Why is a resourceDesignator required when the tender already infers it? Tender implies an instrument. Instrument implies product. Product implies a market. Market implies a resource. If the intent is to identify the market, why not specify the product or market directly? Why is there a CounterPartyID in the responses for EiCreatedTender and EiCanceledTender payload? <i>[Lines 572]</i>	08/Feb/22	RESOLVED	Rewrite Resource Designator and clarify Tender payload UML. Resource Designator rewritten; not an attribute for Tender. CounterParty may be rewritten so is returned in EiCreatedTender CancelTender may reference a bilateral or market counterparty.
Distribute Tender	Toby Considine	FACET	Horia Pop; Lateral Inc https://lists.oasis-open.org	ENERGYINTEROP-727	Tender Facet à Distribute Tender I cannot find a practical use or understand	08/Feb/22	RESOLVED	Deleted EiDistributeTender. See

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			/archives/energyinterop-comment/202112/msg00001.html		the need for EIDistributeTender payload. <i>[Lines 549]</i>			EiQuote for a similar capability indicating a specific "advertised" tender.
Product Warrants	Toby Considine	ARCH-CONF	Horia Pop; Lateral Inc https://lists.oasis-open.org/archives/energyinterop-comment/202112/msg00001.html	ENERGYINTEROP-725	Product Warrants CTS provides a warning on segmentation and shallow markets risk with the excessive use of product warrants. I believe an actor can achieve the same behavior by extending the tender model within the same market with additional attributes that specify a preference. Therefore, the market matching engine can try to satisfy that preference without the risk of creating a shallow market. <i>[Lines 348,355]</i>	12/Apr/22	RESOLVED	Warrants adhere to a Product in a Market. See Table 8-2 CTS WD16.
Transactions vs Contracts	Toby Considine	ARCH-CONF editorial	Horia Pop; Lateral Inc https://lists.oasis-open.org/archives/energyinterop-comment/202112/msg00001.html	ENERGYINTEROP-724	Transactions vs Contract The standard implies a one-to-one relationship between transaction and contract. In practice, I believe it is more appropriate to have a one-to-many relationship between transactions and contracts. Each party of a transaction will receive its own distinct contract (the counterparty may not be public to each other). Also, for the market to match an integral tender, t may have to match with multiple counterparties tenders to create a transaction. <i>[Lines 282, 318, 379]</i>	22/Feb/22	RESOLVED	Line 282 (Table 2-2): Added "Note: a Tender for one side MAY match more than one Tender on the other side, which would generate multiple Transactions." Line 318 was actually backward. Was: When a Transaction is created, a contract is created between the buyer and the seller. The section: "Party and Counterparty in Tenders and Transactions" has been re-written and addresses and no longer redefines the material on table 2-2. Line 379: this bullet list is not place for substantive discussion. See fix in 282
Matching Engine Privacy	Toby Considine	MARKET PRIV-SEC	Horia Pop; Lateral Inc https://lists.oasis-open.org/archives/energyinterop-comment/202112/msg00001.html	ENERGYINTEROP-723	Matching Engine Privacy I believe the matching algorithm (or at least the type) in a market should be public information to the participants not hidden. It provides trust in the market and allows participants to develop trading strategies accordingly. <i>[Lines 273]</i>	12/Apr/22	RESOLVED	Add both a capability for curves and clearing style to Market Characteristics in Section 8.4 and use in 9.4.
Market-Product-Resource Relationship	Toby Considine	CLARITY MARKET RES-PROD-INSTR	Horia Pop; Lateral Inc https://lists.oasis-open.org/archives/energyinterop-comment/202112/msg00001.html	ENERGYINTEROP-722	Market-Product-Resource Relationship In a few places in the standard, there is vagueness that can be misinterpreted around the cardinality relationship between a market, product, and resource. <i>[Lines 249 Table 2-1]</i>	22/Feb/22	RESOLVED	Rewrite the discussion of Products and Markets to clarify.
Market vs Marketplace	William Cox	MARKET	Horia Pop; Lateral Inc https://lists.oasis-open.org/archives/energyinterop-comment/202112/msg00001.html	ENERGYINTEROP-721	Market vs Marketplace Context When discussing [EMIX] and further down when discussing the Market facet market context/characteristics are used inconsistently introducing confusion. To exemplify contrast the definition in Table 2-1, with the definition in Table 3-4 and Table 3-5, and section 6.1. I suggest clarifying what definition is the one adopted by CTS	11/Apr/22	RESOLVED	Accepted. Market and Marketplace Facets rewritten to clarify and address confusing text.

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					and the distinctions with [EMIX] and [EI]. The order of models in section 6 implies that an actor first requests the Market Context and then the Marketplace Context. In the real world, this would be in reverse. <i>[Lines 249, 282,367, 465, 492]</i>			
Market Rules Enforcement	Toby Considine	FACET MARKET	Horia Pop; Lateral Inc https://lists.oasis-open.org/archives/energyinterop-comment/202112/msg00001.html	ENERGYINTEROP-720	Market Rules Enforcement Until the standard covers the facets, operation, and information models of an auditor and enforcer actor, the free interoperation of distinct conforming implementation is going to be hindered. It is hard to imagine a vendor accepting a standard-conforming actor with a distinct implementation to trade freely, knowing it can introduce malicious behavior and that thereâs no standard way to inhibit it that the actor would oblige by. <i>[Lines 195]</i>	23/Mar/22	RESOLVED	Actor behavior is filtered through the narrow CTS definition. Enforcement of market rules includes EiResponse to describe why a request is rejected. Reconsider this analysis for Public Review 2, as much has changed.
Power vs Energy	Toby Considine	CLARITY PREREQ	Horia Pop; Lateral Inc https://lists.oasis-open.org/archives/energyinterop-comment/202112/msg00001.html	ENERGYINTEROP-719	Power vs Energy In the initial part of the document both power and energy are referred to as acceptable values for a Resource. Given thereâs an ongoing confusion between power and energy, I believe the TC should not promote both in the standard as acceptable. To have any practical TE use energy must always be bound to a unit of time and thus a rate of delivery (power). Whether the power should be leveled or follow an acceptable curve within the interval as defined in [EMIX] thatâs beyond the scope. The resource that an actor tenders, transacts, delivers, and settles is energy. Power is just an attribute of that energy tender, contract, and delivery. <i>[Lines 11,16,17,229]</i>	22/Feb/22	RESOLVED	Section 3.2.1 defines Resource Designator as an extensible enumeration as suggested elsewhere. Market participants use their own conceptual models which continue to include power, energy, and other resources. The understanding of e.g. delivery rates is typically not separated out.
Tickers and Quotes	Toby Considine	FACET	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-716	There are 30 specific recommendations in the "Specific Recommendations" section of the submitted Hammerstrom paper. I have numbered them all for traceability as I recombine them into specific issues. The original white paper/submission can be read in the URI under "environment" 30. Section 12.2: Recommend deleting this section unless a useful distinction between "Tickers" and "Quotes" can be stated.	12/Apr/22	RESOLVED	Market Information Facet Section 13 rewritten.
Transaction States	Toby Considine	ARCH-CONF	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-715	There are 30 specific recommendations in the "Specific Recommendations" section of the submitted Hammerstrom paper. I have numbered them all for traceability as I recombine them into specific issues. The original white paper/submission can be read in the URI under "environment" 24. Section 8: This section points out the weakness of using transaction and Transaction differently. I liked the use of Transaction in TEMIX as a state of a transaction. All this subtle distinction is lost if capitalization is not used consistently, as is the case in this section. 26. Table 9-2: I think the fact that an EiTransaction always has Transactive State=transaction is a vestige of an earlier, preferable approach. Wouldn't it be much more elegant to define a single transaction	23/Mar/22	RESOLVED	Item 24: No action - can't find referenced text. Item 26: No action. We have removed Transactive State, using the strongly typed payloads to reflect the EMIX Transactive State and the TEMIX/CTS restriction.

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					behavior, in which the transaction migrates through its available states? Each of the Tender Facet, Transaction Facet (and possibly Quote Facet) should be defined as state transition behaviors, but I question why the structure of the interaction payloads should differ at all. • Tender, Transaction, Delivery, (Quote) address states of an interaction and were more clearly addressed by a TEMIX enumeration. This may be an unwise simplification, as it limits future extension of interaction attributes.			
Party and Party Registration	Toby Considine	PREREQ	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-713	There are 30 specific recommendations in the "Specific Recommendations" section of the submitted Hammerstrom paper. I have numbered them all for traceability as I recombine them into specific issues. The original white paper/submission can be read in the URI under "environment" 22. Section 7: As for the prior comment, use an informative name like "Party Registration" for this interaction. I would vote to entirely eliminate word "facet" from this document as it is not defined and useful within a standardization context. 23. Section 7: The properties of a Party are not addressed, but the Party of an electricity market should specify location, I hope, if it is to support future location-specific transactions and outcomes.	23/Mar/22	RESOLVED	Added Party Registration facet with optional location. Seek WD17 Section 6
Resources / Products / Instruments	Toby Considine	RES-PROD-INSTR	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-712	There are 30 specific recommendations in the "Specific Recommendations" section of the submitted Hammerstrom paper. I have numbered them all for traceability as I recombine them into specific issues. The original white paper/submission can be read in the URI under "environment" 12. Table 3-2, Resource row: Consider offering an extensible enumeration for Resource. If this is not done, duplicate Designators and Names will evolve for the same Resource. 16. Line 378: "Products" → "Instruments"? 20. Table 5-1, "Resource Designator" row: Shouldn't this be a reference to a specific Product, not Resource? 27. Line 669: Editing needed.	12/Apr/22	RESOLVED	Accept the enumeration suggestion for Resource Designator; other editorial fixes as described.
Minimal and Fractal	William Cox	ARCH-CONF	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-710	There are 30 specific recommendations in the "Specific Recommendations" section of the submitted Hammerstrom paper. I have numbered them all for traceability as I recombine them into specific issues. The original white paper/submission can be read in the URI under "environment" 6. Section 1.6: I'm awaiting the novel value of this "minimal transactive profile." If valuable, why are the referenced standards not being extended instead of creating a separate CTS standard? 7. Section 2.1.1: This claim of hierarchical or "fractal" application of CTS is questionable. It seems that CTS provides means of procuring needed and selling surplus energies in time, but it does not aggregate	11/Apr/22	RESOLVED	See comments. 6. Extension does not allow simplification of the type taken (e.g. refactoring the Emix Basek complexity). See other responses. 7. Supply and demand curves are supported as of WD17 10. Addresses current software engineering practice.

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					the opportunities that could be embedded in an aggregate supply or demand curve. It is unlikely that dissimilar aggregated devices or prioritizable actor preferences can be combined at the same identical strike price. 10. Section 2.2.1: This treatment of "facets" seems to be a step backward and is not architecturally sound. The "facets" are first introduced as properties of interactions and later as Actor roles. These are certainly not actor roles and do not inherently even belong to Actors. What an odd mix! (Maybe these are "interaction profiles"?)			
Market Cloudiness	William Cox	CLARITY MARKET	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-709	There are 30 specific recommendations in the "Specific Recommendations" section of the submitted Hammerstrom paper. I have numbered them all for traceability as I recombine them into specific issues. The original white paper/submission can be read in the URI under "environment" 8. Table 2-1: Row "Market Context": Acronym "URI" has not been previously defined and should be spelled out on its first use, please. 9. Table 2-2: Facet "Marketplace" might be needed where multiple markets exist. • The Market is an object from among Marketplaces and may have numerous attributes. 21. Section 6: This is finally made clear that the "Market Facet" refers to a defined query behavior or "interaction profile." Why not use an informative, intuitive name like "Request Market Characteristics" instead of inventing all these "facets"?	22/Feb/22	RESOLVED	(1) URI is a common term widely used throughout network discussions and defined in this use in Energy Interoperation [EI]. No action. (2) There is indeed a confusion between Marketplace and Market Facets; rewrite to clarify.
Editorial - Consistent Abbreviations and Casing	Toby Considine	editorial	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-708	There are 30 specific recommendations in the "Specific Recommendations" section of the submitted Hammerstrom paper. I have numbered them all for traceability as I recombine them into specific issues. The original white paper/submission can be read in the URI under "environment" There are 30 specific recommendations in the "Specific Recommendations" section of the submitted Hammerstrom paper. I have numbered them all for traceability as I recombine them into specific issues. The original white paper/submission can be read in the URI under "environment" 5. Section 1.6: Do not jump between use of "EI," "Energy Interoperation," and "Energy Interoperation 1.0." I presume these are all covered by acronym and reference "[EI]". 17. Throughout: Consistent capitalization of "Products", "Instruments", "Transactions", etc. is needed. • Section 4.1 and throughout: I'm finding usage of "facet" to be misleading and confusing. These must be properties of some object or class or references to objects' behaviors. Part of the problem perhaps evolves from the double meaning of "transaction" that is being allowed. At times it refers generally to an interaction between Parties; at other times, it refers to a specific state of that interaction after a Tender has been accepted and contracted. If this	01/Mar/22	RESOLVED	Complete editorial pass on these issues.

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					confusion were resolved, you could make clearer reference to the various properties and states that surround interactions between parties. 18. Throughout: Once defined, use "[EI]" consistently.			
Sides or Signs	William Cox	ARCH-CONF	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-707	There are 30 specific recommendations in the "Specific Recommendations" section of the submitted Hammerstrom paper. I have numbered them all for traceability as I recombine them into specific issues. The original white paper/submission can be read in the URI under "environment" There are 30 specific recommendations in the "Specific Recommendations" section of the submitted Hammerstrom paper. I have numbered them all for traceability as I recombine them into specific issues. The original white paper/submission can be read in the URI under "environment" 4. Line 64: The "Side attribute" in an energy market is unneeded if signed quantities are used. How would a battery system offer to transition from being a buyer to being a seller at a given price, for example? It is potentially problematic that a baseline is being assumed but not defined for all TE implementations. 11. Section 2.2.2: The attribute Side (i.e., Buy or Sell) is unneeded if signed quantities are employed.	23/Mar/22	RESOLVED	The point on signed values is well-taken; Energy Interoperation 1.0 uses signed "curtailment" for DR events. The Energy Interoperation base standard is far more complex for Tenders and Transactions - the base type is EmixBaseType, which has been greatly simplified in CTS. The use of Side rather than a signed quantity integrates and works with financial market terminology. No action.
Adequacy of CTS model	Toby Considine	ARCH-CONF	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-706	There are 30 specific recommendations in the "Specific Recommendations" section of the submitted Hammerstrom paper. I have numbered them all for traceability as I recombine them into specific issues. The original white paper/submission can be read in the URI under "environment" 1. Lines 19 – 22: It is problematic that the broader TE community does not universally accept this narrow definition of TE. CTS may work within this narrow definition of TE, but the application of market structs in electric distribution systems and end uses is an immature, evolving technology, and CTS is not yet adequate for communication in these newer visions. 2. Lines 30 – 32: My content above explains why CTS may not be future proof for future TE systems and for mechanisms that already differ from that envisioned by the CTS authors. 3. Line 49: Please see the content above concerning CTS limitations in respect to aggregations of collections of devices. The biggest limitation is that a CTS message possesses only one strike price, which is inadequate to represent aggregations of dissimilar, prioritized devices, that may have differing associated prices and quantities.	23/Mar/22	RESOLVED	Apply recommended use of GWAC Transactive Energy definition.
General Recommendations	Toby Considine	ARCH-CONF	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-705	Here is a summary of how CTS might be modified to extend its applicability to the future cases discussed in this white paper: 1. Select and use a sign convention that will allow electricity quantity to be consistently expressed as a signed quantity.	23/Mar/22	RESOLVED	Resolutions and notes in ALL CAPS below. Some are FIXED some are NO ACTION: 1. Select and use a sign convention that will

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					<p>2. Consider the practice of supporting sets of price/quantity pairs (i.e., vertices) to approximate the functional relationships between price and quantity in a single time interval. This would be a natural extension to CTS, which currently supports a single price/quantity pair.</p> <p>3. Specify a price (e.g. ∞) to indicate inflexibility. The pairing of this indication with a quantity would thereby represent a constant, inflexible supply or demand quantity. Upon completing this extension, the use of existing baseline quantities can become a design option rather than implied necessity. Regardless, documentation should not be silent concerning this current limitation of CTS to only flexible supply and demand components, which implies the need for a baseline apart from CTS.</p> <p>4. CTS appears to be silent concerning the effects of location. While it is claimed that locational impacts are in scope, it is not clear that an Actor's circuit location must be communicated.</p> <p>See attachment (URI in environment) for graphics</p>			<p>allow electricity quantity to be consistently expressed as a signed quantity.</p> <p>NO ACTION - SEE E.G. ENERGYINTEROP-674 AND REGISTRATION</p> <p>2. Consider the practice of supporting sets of price/quantity pairs (i.e., vertices) to approximate the functional relationships between price and quantity in a single time interval. This would be a natural extension to CTS, which currently supports a single price/quantity pair.</p> <p>NO ACTION - SEE ENERGYINTEROP-707</p> <p>3. Specify a price (e.g. ∞) to indicate inflexibility. The pairing of this indication with a quantity would thereby represent a constant, inflexible supply or demand quantity. Upon completing this extension, the use of existing baseline quantities can become a design option rather than implied necessity. Regardless, documentation should not be silent concerning this current limitation of CTS to only flexible supply and demand components, which implies the need for a baseline apart from CTS.</p> <p>ADDRESSED BY COMMUNICATION OF SUPPLY/DEMAND CURVES AND CLEARING PROPERTIES. SEE MARKET FACET CLEAR AND ALL_AT_CLEAR IN WD15</p> <p>4. CTS appears to be silent concerning the effects of location. While it is claimed that locational impacts are in scope, it is not clear that an Actor's circuit location must be communicated.</p>

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Aggregated Flexibility and Inflexibility	William Cox	ARCH-CONF	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-704	<p>Binary supply or demand flexibility might be acceptable for aggregation of household or building demand and supply. But it is unlikely that dissimilar objects' flexibility can be controlled in a binary fashion using the same strike price. Shouldn't DERs supplying utility of different value be prioritized by strike price?</p> <p>In principle, a transactive energy system should be able to represent aggregations of bids and offers from sets of objects having binary flexibility, price-sensitive flexibility, and even inflexibility. The aggregation of an object without flexibility with another have binary flexibility is exemplified by Figure 4. In this example, there is no price at which the aggregate supply or demand quantity magnitude can be reduced to zero. A step appears at the strike price of the object offering binary flexibility.</p> <p>If CTS were to support the supply and demand aggregations of example of Figure 4, it would need to communicate at least two price/quantity pairs. However, it would be better for CTS to support a greater or indefinite number of such pairs if rich aggregations of supply and demand are to be represented.</p> <p>Incidentally, an aggregate curve could very well include both supply (positive quantity) and demand (negative quantity) price/quantity pairs, as would be needed for the indifference supply/bid curve from a battery system performing arbitrage. I recommend the consistent use of signed quantities, like those of panels (b) and (c), because the use of signed quantity avoids separation of an object's supply and demand components, as must be done when using unsigned quantities (i.e., panels (a)).</p> <p>Furthermore, the practice of using signed quantities greatly facilitates aggregation, requiring simply that objects' quantities be added at all defined strike prices, including inflexible quantities at strike price ∞.</p> <p>See attachment (URI in environment) for graphics</p>	23/Mar/22	RESOLVED	<p>LOCATION INCLUDED IN PARTY REGISTRATION IN WD16</p> <p>WD17 Sections 8.4 and 9.4 describe use of supply/demand curves in CTS. The extensible Resource Designator enumeration offers additional resource hence products.</p> <p>Different market clearing methods are exposed through Market Characteristics - see Section 8.4.</p> <p>In addition, smaller scoped markets address flexibility in many cases.</p>
Linear Price Sensitivity	William Cox	MARKET	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-703	<p>Transactive energy systems should also be able to represent non-binary opportunities like price-sensitive quantities. See Figure 3. The use of price sensitivity in bids and offers can improve the accuracy and effectiveness of energy balance achieved via auctions, especially as the system diverges from its normal, expected trajectory. Complete bid and supply curves can also reduce the numbers of iterations needed to discover prices using iterative consensus and game price-discovery mechanisms. Price sensitivity appears quite naturally in conventional generator supply curves that</p>	23/Mar/22	RESOLVED	<p>WD17 Sections 8.4 and 9.4 describe use of supply/demand curves in CTS. The extensible Resource Designator enumeration offers additional resource hence products.</p> <p>Different market clearing methods are exposed through Market Characteristics - see Section 8.4.</p>

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					<p>are typically derived from their quadratic cost curves. If a cost curve is truly quadratic (not linear), offer prices are a linear function of generated quantity.</p> <p>Price sensitivity also appears in transactive energy systems that discover price via centralized or distributed locational marginal pricing algorithms. Most notable is the effect of transport losses that make price become a function of system losses, which are in turn a function of transported quantity.</p> <p>Price sensitivity comes into play for most controllable DER when time intervals become longer than what can be accommodated using binary on/off binary flexibility. Simple heuristic methods (e.g., thermostat bids based on zone temperatures) begin to fail when applied to relatively long future prediction horizons and long market intervals. Under these cases, bids and offers must</p> <p>more accurately predict the actual energy quantity and the impacts of any flexibility. One strategy is to optimize the likely outcome while monetizing the state of the utility (e.g., comfort or discomfort level) that is provided. The result of such an optimization is an indifference curve that expresses the willingness of a prosumer to exchange energy and money.</p> <p>As suggested by Figure 3, CTS might be extended to support simple price sensitivity from an individual object if it were to support a second price/quantity pair. However, the next section will argue that CTS should preferably support communication of many price/quantity pairs if it is to represent effects of aggregation. Even individual objects might require multiple price/quantity pairs when their price sensitivity cannot be adequately represented by only two price/quantity pairs.</p> <p>See attachment (URI in environment) for graphics</p>			
Representing Inflexibility	William Cox	MARKET	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-702	<p>Transactive energy systems should be able to represent both their flexibility and inflexibility. Failure to do so will create exceptions and will rely on assumptions—like the existence of a predetermined market position or baseline. Consider, for example, a transactive system design that must communicate not only its available flexibility, but also its existing baseline apart from such flexibility. Regrettably, the number of objects having no flexibility is typically much greater than the number offering flexibility. Also consider the growth of renewable energy resources, which contribute virtually no flexibility to be controlled by prices but are becoming an important component of global electricity supply.</p> <p>Figure 2 demonstrates alternative representations of inflexible supply and demand. Unlike the binary flexibility discussed in Section 1, inflexible supply or demand possess no meaningful strike price.</p>	23/Mar/22	RESOLVED	<p>WD17 Sections 8.4 and 9.4 describe use of supply/demand curves in CTS. The extensible Resource Designer enumeration offers additional resource hence products.</p> <p>Different market clearing methods are exposed through Market Characteristics - see Section 8.4.</p>

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					Inflexibility implies that the quantity would be the same regardless of price. One way to extend CTS to represent inflexibility would be to populate the strike price with a value (e.g., ∞ or NULL) that would clearly indicate inflexibility. If this number or symbol is used consistently, it would be easy to identify and aggregate inflexible supply and demand See attachment (URI in environment) for graphics			
Binary Flexibility	William Cox	MARKET	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-701	<p>CTS is suited for representing the binary flexibility of individual supply or demand objects.</p> <p>CTS is perfectly able to represent an offer from a conventional fueled generator, for example. The generator offers a quantity of supply at a strike price. The generator may become dispatched if the quantity is paired to willing demand via bilateral trading. Alternatively, the generator may become dispatched by a market if the market clears at a price greater than or equal to the strike price. It is irrelevant how the transactions proceed, but the CTS is suitable for either bilateral trades or real-time bilateral markets. CTS can represent simple binary flexibility from an object. CTS could represent a bid from a residential water heater to consume a quantity of electricity, for example. The control action is binary. If the bid is accepted, the water heater heats water; if the bid is not accepted, it waits idle. CTS could have been used for PNNL's Olympic Peninsula field study, for example, which created a real-time double auction and managed devices as described in this paragraph.</p> <p>However, the applicability of such binary flexibility works only for relatively short time intervals. Many end-use devices must eventually operate and provide a utility to their owners, which is why applicability of CTS may be limited to short-term, real-time market intervals. Over long time intervals such devices cannot remain off. An unstated requirement of CTS is apparently that it requires a pre-existing market position or baseline, and a CTS-based offer or bid represents a diversion from that baseline. It does not seem that CTS can represent the baseline itself, however, although its parent EMIX is said to have this capability.</p> <p>It is argued that CTS can represent aggregated supplies and demands. For example, a bid or offer could be made via CTS for an entire building or for the entities within an energy microgrid. But this works only if the aggregate flexibility remains binary and can be represented at a single strike price. This limits the communication of priorities, as would be possible using supply and demand curves, where quantity may be a rich function of price alternatives.</p> <p>CTS can apparently flag a bid or offer to indicate that its quantity may be partially</p>	23/Mar/22	RESOLVED	<p>WD17 Sections 8.4 and 9.4 describe use of supply/demand curves in CTS. The extensible Resource Designator enumeration offers additional resource hence products.</p> <p>Different market clearing methods are exposed through Market Characteristics - see Section 8.4.</p>

Summary	Assignee	Labels	Environment	Key ↓	Description	Resolved	Status	Resolution
					<p>accepted, but all subquantities then possess the same strike price. CTS also may communicate multiple "Tender" offers to buy or sell, but it does not address the association of such alternatives into a cohesive supply or demand curve and the resulting mutual exclusivity of such alternatives.</p> <p>The commonality between all binary flexibility is that it can be represented by the pairing of a single quantity and single strike price. Figure 1 shows three alternative graphical representations of a CTS bid (or, more generally, of a single object's binary bid or offer). Panel (a) is a conventional way of showing supply and demand, as adopted from wholesale electricity practices. Both supply and demand are shown as positive quantities in the same quadrant. The top, right corner of the supply block is the offered quantity and strike price. Panel (a) shows a single offer. Demand is typically shown as a line. Here an inflection occurs at the demand quantity and strike price. Panels (b) and (c) are alternative representations that use signed quantities and prices. The only differences between the two panels is that (b) shows price as a function of signed quantity, and (c) shows signed quantity as a function of price. While these functional relationships could be mathematically represented in many ways, this white paper will use a piecewise linear approach, which provides a pathway for extension of CTS quite naturally to a broader set of TE applications. A CTS bid or offer requires a single pairing of price and quantity (i.e., a single "vertex"), but a second point is implied for the alternative binary action—the quantity zero at the strike price. This distinction is subtle, but it is important to the extensibility of CTS. Namely, CTS will be extensible if it explicitly includes what is now an implicit price/quantity pairing.</p> <p>Incidentally, all bid and offer prices should be understood to, in effect, extend to positive and negative infinity as shown in panels (b) and (c).</p> <p>See attachment (URI in environment) for graphics</p>			
Missing Functionality	William Cox	MARKET	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008/2111DJH_CTS_Review.pdf	ENERGYINTEROP-700	<p>. CTS therefore may lack functionality needed for some emerging transactive energy systems. Specifically, the standard lacks abilities to represent</p> <ul style="list-style-type: none"> • Inflexible supply or demand • Price-sensitive supply or demand • Aggregation of supply offers and demand bids <p>There are potentially elegant ways to extend CTS to facilitate these capabilities that are currently missing from the draft standard.</p>	23/Mar/22	RESOLVED	Sections 8.4 and 9.4 describe use of supply/demand curves in CTS. The extensible Resource Designer enumeration offers additional resource hence products,
White Paper	William Cox	OTHER	Donald Hammerstrom https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00008	ENERGYINTEROP-699	<p>Detailed white paper with schematics and many comments attached. (See URI for environment, or attachment)</p> <p>Will attempt to transfer all as issues, but</p>	23/Mar/22	RESOLVED	The white paper was the source of numerous useful comments, but in of itself requires no

Summary	Assignee	Labels	Environment	Key ↓	Description	Resolved	Status	Resolution
			/2111DJH_CTS_Review.pdf		including overall white-paper as guidance.			action. See issues on component cts with "Hammerstrom" in the Environment field.
Editorial Minor	Toby Considine	editorial	H Walter Johnson https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00007.html	ENERGYINTEROP-698	Some miscellaneous typos: Line 356: "that to shallow" should probably read "that are too shallow". Line 668, "report and power" should probably read "report any power". Line 712: "match buy and" should probably read "match buyer and". Line 912: "seller increase" should probably read "seller to increase" Line 914-15: "the sender" should probably read something like "the identities of the sender". Line 916: "able detect" should probably read "able to detect".	01/Mar/22	RESOLVED	Agreed. Changes accepted.
Conformance with WS-Calendar	William Cox	ARCH-CONF	H Walter Johnson https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00007.html	ENERGYINTEROP-697	When discussing Conformance (Section 14), line 780 says Portions of CTS conform to and use updated and simplified versions of the specifications. I guess it's possible for a spec's conformance rules to allow the CTS spec to both conform to it and to extend it, but it does sound somewhat paradoxical. Besides, the WS-Calendar spec says [lines 1553-1554] that "Specifications that...claim conformance with WS-Calendar SHALL define the business meaning of zero duration Intervals and I don't find that in the CTS spec.	07/Feb/22	RESOLVED	Corrected reference to show CAL-MIN not [WS-Calendar] A future draft will add an Informative Appendix to describe conformance with the TEMIX profile of Energy Interoperation (using the methods of IEC 62746-10-3)
TransactionID and Data Types	Toby Considine	ARCH-CONF	Rolando Herrero https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00003.html	ENERGYINTEROP-695	Page: 41, Line: 604 -> How is the transaction ID defined? Some of these tables like 8-2 and 9-2 should specify the data type of each attribute.	08/Feb/22	RESOLVED	The underlying types are usually implemented as UIDs. The scope of uniqueness is a Marketplace. A future version should include descriptive text on the Energy Interoperation 1.0 IDs and their simplification in CTS.
PartyID Uniqueness	Toby Considine	ARCH-CONF	Rolando Herrero https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00003.html	ENERGYINTEROP-693	Page: 18, Line: 307 -> How are PartyIDs assigned? Are they unique? How is uniqueness enforced?	08/Feb/22	RESOLVED	See WD17 Section 6 Party Registration Facet. The underlying types are usually implemented as UIDs. The scope of uniqueness is a Marketplace.
More complex than TEMIX	William Cox	ARCH-CONF	Edward G. Cazalet, TEMIX https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00001/Cazalet_Comments_on_CTS.pdf	ENERGYINTEROP-691	15. The Proposal does not simplify TEMIX as claimed. Most, if not all, of the claimed benefits of the Proposal, are provided by TEMIX. The Proposal's messages are not simpler than TEMIX messages and are likely incompatible (the messages are not yet published). TEMIX, as it stands, is fully capable of providing transactive services in any market, although its documentation in	23/Mar/22	RESOLVED	CTS avoids the complexity of EMIX, providing a semantically identical (therefore mappable) and easier to integrate approach for modern systems including financial markets.

Summary	Assignee	Labels	Environment	Key ↓	Description	Resolved	Status	Resolution
					EMIX and EI could be "cleaned up" in a new standalone TEMIX profile of these standards. Hence the Proposal only adds confusion to the detriment of Transactive Energy progress			No action.
CTS incompatible with CTS 2016	William Cox	ARCH-CONF	Edward G. Cazalet, TEMIX https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00001/Cazalet_Comments_on_CTS.pdf	ENERGYINTEROP-690	14. The Proposal for Common Transactive Services (CTS) offers no more interoperability (likely less because of flaws) than TEMIX. As a result, CTS is oversold in this Proposal. In addition, the Proposal does not fully implement and is incompatible with the CTS in CTS2016 for reasons described above.	27/Apr/22	RESOLVED	CTS2016 was proposed outside a standards process. As open source implementations evolved, CTS evolved to address integration with financial markets and limit complexity, while maintaining consistency with current software engineering and architecture principles. In short, CTS 2016 was not a standard, and compatibility with an informal specification is atypical.
Offset Time unworkable	Toby Considine	MARKET	Edward G. Cazalet, TEMIX https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00001/Cazalet_Comments_on_CTS.pdf	ENERGYINTEROP-689	13. The Proposal's option to have markets with offset Start Times is unworkable and unnecessary.	23/Mar/22	RESOLVED	Not clear how offset markets are "unworkable" - please clarify. This descriptive attribute seems not to limit capabilities. One use case is substation with offsets for different feeder markets, limiting time-based strike time destructive interactions, commonly applied in 61850 environments. Add clarifying text to the characteristics table.
End-Party Participation unhelpful	William Cox	MARKET	Edward G. Cazalet, TEMIX https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00001/Cazalet_Comments_on_CTS.pdf	ENERGYINTEROP-688	12. End Party participation in local clearing markets offered in the Proposal will typically see low participation and low liquidity, so such markets will be inefficient and unworkable except perhaps in exceptional circumstances.	01/Mar/22	RESOLVED	Text was re-written to indicate that alternate market models are options that could be done, not mandates to do. This general fix was applied in several parts of the document. The Over-The-Counter mechanisms and an initial discussion of registration of bilateral transactions partially address liquidity and participation issues.
Are Independent Markets required?	William Cox	CLARITY MARKET	Edward G. Cazalet, TEMIX https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00001/Cazalet_Comments_on_CTS.pdf	ENERGYINTEROP-687	11. While the Proposal includes bilateral transactions, the Proposal's favored alternative of independent, local clearing markets (market engines) is unworkable in a grid where fine locational and time granularity is essential, and liquidity of tenders is minimal.	22/Feb/22	RESOLVED	The point is well taken. The Over-The-Counter mechanisms and an initial discussion of registration of bilateral transactions partially addresses the issue.

Summary	Assignee	Labels	Environment	Key ↓	Description	Resolved	Status	Resolution
Are EiQuote and EiDelivery needed?	Toby Considine	FACET	Edward G. Cazalet, TEMIX https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00001/Cazalet_Comments_on_CTS.pdf	ENERGYINTEROP-685	9. The omission in the Proposal of EiQuote is not an improvement as this service should never have been in TEMIX. Likewise, the Proposal's omission of the EiDelivery service makes no sense, especially as the Proposal has a significant discussion of Delivery.	23/Mar/22	RESOLVED	The Quote and Ticker Facets address the first part of the comment. The Delivery Facet is now in the specification.
Eliminate Cancel Tender	Toby Considine	FACET	Edward G. Cazalet, TEMIX https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00001/Cazalet_Comments_on_CTS.pdf	ENERGYINTEROP-684	8. The Cancel Tender operation cannot be required in any TEMIX implementation because a Party executing more than one transaction cannot rely on both transactions being executed. Moreover, tender cancelation can be an invitation to market manipulation.	27/Apr/22	RESOLVED	No action. EiCancelTender has been in Energy Interoperation and its TEMIX profile since at least 2014. NOTE: Still needs reference and text on Distributed Agreement Protocols.
Expiration of Tender rule too restrictive	Toby Considine	FACET	Edward G. Cazalet, TEMIX https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00001/Cazalet_Comments_on_CTS.pdf	ENERGYINTEROP-682	6. In conflict with the Proposal, there are valid use cases for a tender that expires after the start time of the associated interval.	08/Feb/22	RESOLVED	There is no constraint on expiration time. See WD17 Section 3.2.3. Conformance (text pending) will have the same description.
Definition of Transaction inconsistent with EI	William Cox	ARCH-CONF CLARITY	Edward G. Cazalet, TEMIX https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00001/Cazalet_Comments_on_CTS.pdf	ENERGYINTEROP-681	4. The definition of a Transaction in the Proposal is different from TEMIX for no apparent reason.	22/Feb/22	RESOLVED	Removing EmixBase and associated complexity resulted in a simplified definition of EiTransaction. The same information is present with the enhancement that the relevant EiTender is included by value and not by reference (which assumes fast access to a database of Tenders).
Missing Transport	Toby Considine	CLARITY RES-PROD-INSTR	Edward G. Cazalet, TEMIX https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00001/Cazalet_Comments_on_CTS.pdf	ENERGYINTEROP-679	3. There is no formal role in the Proposal for Transport Products as in TEMIX.	27/Apr/22	RESOLVED	WD17 Section 2.3.1 includes a Resource Designator extensible enumeration which includes Transport.
Order and Undefined Terms	Toby Considine	editorial	Trevor Hardy, PNNL https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00000.html	ENERGYINTEROP-676	page 18 line 307 "Delegation" is an undefined term up to this point in the document. "PartyID" is an undefined term up to this point in the document.	01/Mar/22	RESOLVED	Re-wrote section to avoid use before definition.
Inappropriate Issues	Toby Considine	editorial	Trevor Hardy, PNNL https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00000.html	ENERGYINTEROP-675	page 18 line 304 These questions seem out of character to include in a standard.	01/Mar/22	RESOLVED	Agreed. Editor's working "notes to self" got included in release, which explains odd-tone and language. Paragraphs were deleted and section was re-written to focus solely, as indicated in title, use of Party and CounterParty in Tender and Transaction messages
Hiding from Actors	William Cox	MARKET	Trevor Hardy, PNNL https://lists.oasis-open.org	ENERGYINTEROP-674	page 16 line 273 Doesn't the nature of the matching engine	23/Mar/22	RESOLVED	Section 8.4 WD17 includes both a Clearing

Summary	Assignee	Labels	Environment	Key ↓	Description	Resolved	Status	Resolution
			/archives/energyinterop-comment/202111/msg00000.html		define the nature of the messages needing to be exchanged? Submitting tenders to an order book can require the communication of different information than that of a double-auction (point price-quantity pairs vs full supply or demand curves). Doesn't this require that the Actors are aware of this when submitting messages? I don't understand how "this complexity is hidden from the Actors".			Method characteristic which allows trading strategies to address different clearing algorithms and a means for conveying supply/demand curves
Bias in Matching Algorithm	William Cox	CLARITY MARKET	Trevor Hardy, PNNL https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00000.html	ENERGYINTEROP-673	page 16 line 261-262 It has already been stated that CTS does not prescribe the nature of the matching engine but doesn't the definition of part and counter-party at least strongly imply some kind of matched bi-lateral trade? Double-auctions can artificially create the appearance of bi-lateral trades after the clearing price and quantity have been established but it would be a layer of artifice. For the concept of "party" and "counter-party" to be an integral part of CTS seems to heavily lean towards bi-lateral matching engines.	22/Feb/22	RESOLVED	Updated introduction on use of Actor and Facet terminology throughout Expanded existing text on when and how to use a market ID as a counterparty, including when a group matching approach is used. Section 8.4 WD17 includes a Clearing Method which allows trading strategies to address different clearing algorithms.
Support for Consensus Markets	William Cox	MARKET	Trevor Hardy, PNNL https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00000.html	ENERGYINTEROP-672	page 15 Table 2-1 What about distributed or consensus mechanisms that do not necessarily communicate instruments among market participants? It seems like these mechanisms would not be supported by CTS, true?	23/Mar/22	RESOLVED	Fixed. Support for demand and supply curves is described in WD17 Section 8.4 (Market Characteristics) and 9.4 (Tender Facet).
Resource Definition and Location	Toby Considine	RES-PROD-INSTR	Trevor Hardy, PNNL https://lists.oasis-open.org/archives/energyinterop-comment/202111/msg00000.html	ENERGYINTEROP-671	page 15 line 228 Resource definition should include the value of the commodity also depending on the location of delivery, right?	23/Mar/22	RESOLVED	Fixed. See WD17 Section 2.1.3 and 7.2.

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