Suggested Future Enhancements to CPPA Negotiation Specification

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1 Negotiation Protocol

1.1 Negotiate directly with CPPs and both Parties' "CPP" NDDs

Negotiating with both Parties' CPPs and "CPP" NDDs is a purer peer to peer negotiating system than working with a CPA template and corresponding NDD prepared by one Party. However, see the discussion in the CPPA Negotiation specification of the advantages of the CPA template.

1.1.1 Introduce new NDD during negotiation of a CPA template

Permit a counter offer from the party that received an initial offer to include its *NDD* in its counter offer. In version 1, the party receiving the initial offer can introduce its *NDD* only by rejecting the initial offer and then making an initial offer of its own.

Introducing the second party's *NDD* during the negotiation amounts to "logically" merging the two *NDDs* into a combined set of negotiable items. However, there might well be incompatibilities between the two *NDDs*. The specification will have to state how to resolve such incompatibilities.

1.1.2 Full Peer to Peer Negotiation with CPPs and "CPP" NDDs

Neelakantan Kartha proposed the following procedure:

Party A has CPP_A and and NDD_A that points to CPP_A. Party B has CPP_B and NDD_B that points to CPP_B.

1. Party A and Party B negotiate on elements that are in the CPP and come to an agreement on them. NDD_A and NDD_B are used during this process.

2. One of the Parties (say, Party A) now makes a CPA template that contains the agreed upon values produced in step 1, as well as elements that are specific to the CPA (such as start, end etc.). Party A also produces an NDD1_A that points to the CPA template. Note that NDD1_A does NOT refer to the elements of the CPP, since they already have been negotiated and agreed upon. NDD1_A only points to the CPA specific requirements that may be put in. NDD1_A might depend on the first negotiation.

3. Consequently Party B also produces a similar NDD1_B.

4. Party A and B negotiate on the elements that are in the CPA template and come to an agreement on them. NDD1_A and NDD1_B are used in this process.

1.2 Negotiating about which BPSS Instance is to be used

There was some discussion Sept. 17-18, 2002 about whether a counter offer can propose a different BPSS instance (for the business process) from the one proposed in the initial offer. If it is decided not to permit this in version1, it should be considered later.

1.3 Re-opening Previously Agreed Items

It is possible that later agreement on part of the *CPA* might require reopening something that was previously agreed to. This would require removing the prohibition against going backward (reopening previously agreed items).

Similarly, if an item is deleted from the CPA-under-construction at some point in the negotiation, version 1's restriction against going backward prohibits adding it back in later.

1.4 Reinstating A Prior Offer or Counter Offer

- Problem: *Party* A receives a counter offer from *Party* B and replies with a counter offer of its own. Based on the response to the counter offer, *Party* A then decides to reconsider *Party* B's original counter offer. How is this offer put back on the table? Possibilities:
  1. *Party* A issues *Party* B's offer as a counter offer. This might confuse *Party* B since it is really *Party* B's counter offer.
  2. *Party* B somehow gets initiative to re-issue the offer. Given the general rules about not repeating identical offers, how does *Party* B recognize that it would be fruitful to reissue the counter offer?
- The solution could be provided by broadening the function of the counter-pending message into a more general response. One value would open the way to *Party* B's reissuing the prior counter offer. Possible values, assuming *Party* B sent an offer to *Party* A are:
  - Counter pending: *Party* B's offer is partly acceptable. *Party* A is going to send a counter offer next.
  - Conditionally accepted: This offer might be acceptable but *Party* A wants to do better and is going to issue a counter offer next.
  - Firmly declined: This cannot work. Do not reissue it. Reissue would be an error condition. *Party* A is going to send a counter offer next.
  - Re-send prior offer (accompanied by its offer ID): *Party* A wants to reconsider the prior offer. *Party* B has initiative to re-send that counter offer.

Figure 1 illustrates the offer-reinstatement scenario.

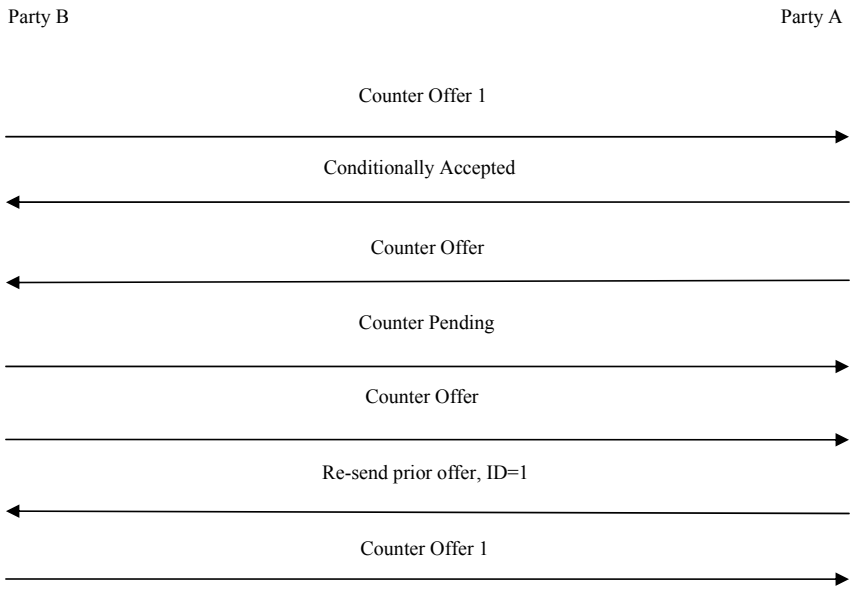

Figure 1, Offer Reinstatement Scenario

1.5 Determining whether Anything Remains to be Negotiated

There may be cases where Party B accepts a counter offer and has nothing further to propose but knows that there may still open subjects and that Party A should submit proposals on them. This can happen if each party has its own strategy for order of negotiation. Sending the acceptance without "counter pending offer" could pass initiative to Party A to submit the next counter offer. To enable this case, we would need to provide a message by which Party A tells Party B that he is finished. The response to a counter offer would consist of either a confirmation of acceptance or a counter offer from A to B. This is similar to the previously proposed case where Party B wants Party A to re-present a previous counter offer

The above is essentially the same function as the proposed procedure (see section 1.4) for asking the other party to put a prior counter offer (or the original offer) back on the table.

See also section 1.4.

1.6 Ordering Dependencies among Negotiable Items

If version 1 does not define ordering dependencies among negotiable items, this should be considered for a future version.

The negotiable items may not be able to be negotiated in an arbitrary order because there may be dependencies among them that fix the order of negotiation. Security aspects of some of the protocols may be one example. Certificate details cannot be negotiated until it has been agreed that certificate-based security will be used for message exchanges. Any ordering dependencies

will have to be expressed in the NDD. Ordering dependencies also mean that a counter offer will omit items that cannot be negotiated until after the items in that counter offer are agreed to.

Another example is that item A, which is stated in the NDD as negotiable and has not yet been negotiated, might become non-negotiable as a result of an agreement on some other item B. Negotiating item A before item B could result in a different outcome. NOTE: we need a non-trivial example of this case.

1.6.1 Order of Negotiating the Negotiable Items

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Version 1 defines the following responses from Party B to an offer or counter offer from Party A.

1. Success (a complete CPA has been achieved)
2. Fail (Party B has unresolvable problems with the draft)
3. Counter pending offer: Party B is going to present a counter offer to Party A.

This flow requires that:

1. The initial offer must include proposals for all negotiable items.
2. Each counter offer must include proposals for all open items.

Party A might have a private negotiation strategy that includes the order of negotiating the negotiable items and may not wish to show the whole ordering structure to *Party* B. Can this strategy be kept secret without compromising interoperability? A problem could arise if *Party* B does not wish to negotiate in the same order. *Party* B could use the procedure below to defer the offer or counter offer. See section 1.6.2.

Should we allow the negotiation of some items to be deferred until later? This would mean that an offer or counter offer might not include proposals for all open items. If Party A sends such a counter offer to Party B, Party B might accept all the items in the proposal but there are still open items. If so, who goes next? Possibilities:

1. Party B responds with an additional response, "accept", which means "I accept your proposals and await your next counter offer for the open items".
2. Party B has to respond with "counter pending offer" and then submit a counter offer for some or all of the open items. The problem here is that there may be some question of which party is in a position to submit the next counter offer for some or all open items.
3. Both of the above are allowable.

Note that both specific ordering dependencies (Section 1.6) and the negotiation strategy question discussed above probably have the same protocol solution

1.6.2 Order of Negotiation, Dependency Graphs

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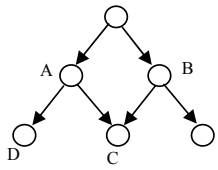
It is possible that negotiation of some items depends on the results of negotiating other items. These dependencies can be expressed as a tree and negotiated from the root downward. For example:

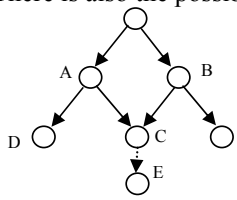


In general, negotiation can proceed from the root downward until a node is reached that cannot be negotiated without completing others first. At that point, the navigation can proceed left to right. For example, in the above drawing, node C has dependencies on both node A and node B. Both A and B have to be negotiated before C can be negotiated. So, node A will be negotiated, followed by node D. Since node C cannot be negotiated yet, the navigation will back up to the top and negotiate node B followed by node C.

If each *Party* has its own private dependency graph, there is the possibility of deadlocks caused by differences in ordering of the two *Parties'* graphs. The simplest solution is to require that the dependency graph be known to both *Parties*. It could be included in the NDD or referenced by it.

The dependency graph should include only those items that are involved in dependencies; it should not include items where the order of negotiation does not matter.

There is also the possibility of an impasse as shown below.



The dotted arrow between nodes C and E is intended to illustrate an impasse. Although nodes A, B, and C, have all been negotiated, node E cannot be negotiated. This is presumably a negotiation impasse between the two *Parties* that required human contact to resolve.

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1.7 Doing Better than an Acceptable Proposal

Here is an example of a proposal that is acceptable, but recipient thinks he can do better.

Two parties have transport preferences ordered as shown below. *Party1* proposes using FTP, which is acceptable to *Party2*. *Party2*, however, notices that SMTP would be only marginally less desirable to Party1 but much more desirable to himself.

Party1	***Party2***
FTP	SMTP
SMTP	HTTP
HTTP	FTP

Party2 should be able to "table" *Party1's* original (FTP) proposal long enough to propose SMTP. If *Party1* accepts, fine. Otherwise, *Party2* can then un-table the FTP proposal and agree to it without having to start over.

This can be done using the above procedure of responding to *Party1's* counter offer with "conditionally accepted", counter-offering with SMTP and then, if *Party1* rejects SMTP, requesting "re-send prior offer".

1.8 Going Back to Previously Agreed Items

Version 1 states that once agreement has been reached on any part of the *CPA,* those elements and attributes SHALL NOT be reopened for negotiation. However, there may be cases in which multiple negotiable items interact. For such a case, backtracking might be a necessary part of converging the negotiation of the set of interacting items.

1.9 Detection of Lack of Forward Progress in the Negotiation

Consider defining the meaning of "no forward progress" and the protocol for detecting this condition.

1.10 Packaging of Messages

Consider physically packaging the response message with the counter offer if one is being issued, in order to save message traffic. Can this be done using existing business signals for the response indicator (in order to avoid CPPA changes)?

Monica Martin pointed out that the Message Service team is considering not allowing signals to be packaged with messages.

1.11 Need for Human Input

Negotiation of some items may require human input. This should be indicated in the *NDD* for those items. We have to define how to indicate that human input is needed.

1.12 Suspending and Resuming the Negotiation Dialog

It may be worthwhile to provide a protocol for suspending and later resuming a *Negotiation Dialog*. Suspension would be used whenever it is necessary for one *Party* to pause for a longer period than permitted by the BPSS timing values defined in the NCPA.

The *Conversation* ends when the negotiation is suspended. When the negotiation is resumed at a later time, a new *Conversation* is started. Suspending and resuming a negotiation requires that the applications persist all the state information needed for resuming the negotiation later. The *Party* that issues the *Message* which causes the negotiation to resume MUST include the *Negotiation-Dialogue Identifier* in the *Message*. When the *Negotiation Dialog* is resumed, the *Negotiation-Dialogue Identifier* SHALL be used to obtain the state information necessary to resume the negotiation.

The statement in the specification that relates a *Negotiation Dialog* to a *Conversation* should be modified to state: "A single *Negotiation Dialogue* (executed without being suspended and resumed) corresponds to a single ebXML *Conversation*".

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It will be necessary to define a complete protocol for suspension and resumption and add it to the Negotiation BPSS Instance. Following are some suggestions:

- Suspension is used when the party that has the initiative to reply to an offer or counter offer needs more time than is permitted by the time attribute that governs the response.
- The *Party* that has the initiative to reply to an offer or counter offer can send a "suspend" message. This satisfies whatever time limit is in effect and lets the other party know that the reply will come later.
- The same *Party* then has the initiative to send the counter offer later.
- When the negotiation is suspended, both *Parties* shall use the negotiation identifier to keep track of the state information about the suspended negotiation.
- Something should be said about the BPSS-level time attributes for the suspension case.

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1.13 Alternative Specifications of Collaboration Protocol Choreography

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Future versions of the specification could support alternative forms of specifying either the choreography of the business collaboration that the *Parties* will execute in place of the BPSS or the negotiation choreography. One possibility is the collaboration protocol used with Web services.

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For the business collaboration protocol that the *Parties* will execute in doing business, the CPPA specification already states that alternatives to BPSS may be used. However it leaves it to the *Parties* to the *CPA* to agree on the meaning of the elements and attributes under the CollaborationRole element. The CPPA negotiation specification would have to define how to negotiate about the elements and attributes under the CollaborationRole element when an alternative to BPSS is used.

For negotiation, the choreography description is part of the negotiation protocol and has to be specified normatively. In order to use an alternative negotiation choreography, the CPPA negotiation specification would have to be extended to provide a normative description of the choreography and negotiation protocol based on the alternative to the BPSS.

1.14 Bounding the Time to Complete Negotiation

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Is there a way of specifying the maximum time to complete a negotiation from initial offer to completion? Is there a BPSS time attribute that can be used? Monica Martin said that BPSS defines a time to perform at the level of the whole collaboration. This might be useful. However, a maximum completion time ought to be negotiable. It should be understood that BPSS attributes cannot be negotiated without negotiating the Negotiation CPA. For this reason, we might want a different approach than a BPSS time attribute.

One possibility is to define a time that could be expressed in the NDD and can be negotiated.

Another possibility is to define an iteration count in the NDD, such as the maximum number of offer-counter cycles permitted.

If a negotiation time or iteration count is to be negotiated, the specification should probably define that this negotiation shall take place immediately following the initial offer and be limited to, say, 2 iterations.

2 Negotiability

2.1 CPAId

Is there any need to negotiate the CPAId format as well as its value? For this purpose, "format" refers to whether the CPAId is a URI or some other format. The CPPA specification RECOMMENDs but does not REQUIRE the use of a URI.

2.2 CPA Extensibility Elements

CPA extensions should be negotiable.

2.3 Negotiating Delivery Channels

We might want to provide for negotiating new delivery channels, i.e. new combinations of the Transport and DocExchange elements that are in the *CPPs*. This would involve dynamic reconfiguration of the server, which may or may not be possible. If reconfiguration is possible, it may involve software changes, etc., in order to accommodate the change.

2.4 Interrelations Between Different Numeric Parameters

One commenter suggested an example of interrelation between price ranges and quantity ranges. This example is applicable if and when the team includes business-level quantities in the negotiation process.

2.5 Direct Modification of BPSS Instance Document

Direct modification of the BPSS instance document could be supported as part of the negotiation process if the BPSS team defines how to do it.

2.6 Interaction between CPA Negotiation Specification and Higher-Level Agreements

Monica Martin pointed out that CPA negotiation should not allow the change of agreement items that are dictated by the terms and conditions in a pre-existing business-level agreement, should one exist. This also applies to any signals associated with the transaction within a collaboration. See Brian Hayes.

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3 Negotiation Algorithm

The negotiation algorithm is out of scope for version 1. It is described as part of the private process at each party. The specification may have to prescribe aspects of the negotiation algorithms that ensure interoperability.

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4 Negotiation Intermediaries

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Consider enhancing the specification to support negotiation intermediaries. A negotiation intermediary plays an active role in the negotiation. It is not just a message-forwarding intermediary. It functions as a broker in support of a negotiation between two *Parties*.

The broker receives offers, counter offers and responses and passes them on to the other *Party*, perhaps performing some processing of the offer or counter offer. The negotiating *Parties* might tell the broker things that are not to be told to the other *Party*. The *Parties* might reveal aspects of their private negotiation strategies to a trusted broker that they would not directly reveal to the other *Party*. Some examples are upper and lower limits of negotiable values and what a *Party* is really in the market for.

Enhancing the specification to support brokers would include defining broker-specific function and the protocol and choreography to support it. There would have to be a *CPA* between each *Party* and the broker in addition to the *NCPA* between the two *Parties*.

Monica Martin noted that there is a very interesting proposal from Bob Haugen and Tony Fletcher for multi-party collaboration that may have an effect on the view of intermediaries. Following is the link to their white paper on the TMG site:
http://www.supplychainlinks.com/UNCEFACT-papers.htm
See: tony.fletcher@choreology.com