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FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS
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FIPA Iterated Contract Net Interaction Protocol
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Specification
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Foreword

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The members of FIPA are individually and collectively committed to open competition in the development of agent-based applications, services and equipment. Membership in FIPA is open to any corporation and individual firm, partnership, governmental body or international organization without restriction. In particular, members are not bound to implement or use specific agent-based standards, recommendations and FIPA specifications by virtue of their participation in FIPA.

The FIPA specifications are developed through direct involvement of the FIPA membership. The status of a specification can be either Preliminary, Experimental, Standard, Deprecated or Obsolete. More detail about the process of specification may be found in the FIPA Document Policy [f-out-00000] and the FIPA Specifications Policy [f-out-00003]. A complete overview of the FIPA specifications and their current status may be found on the FIPA Web site.

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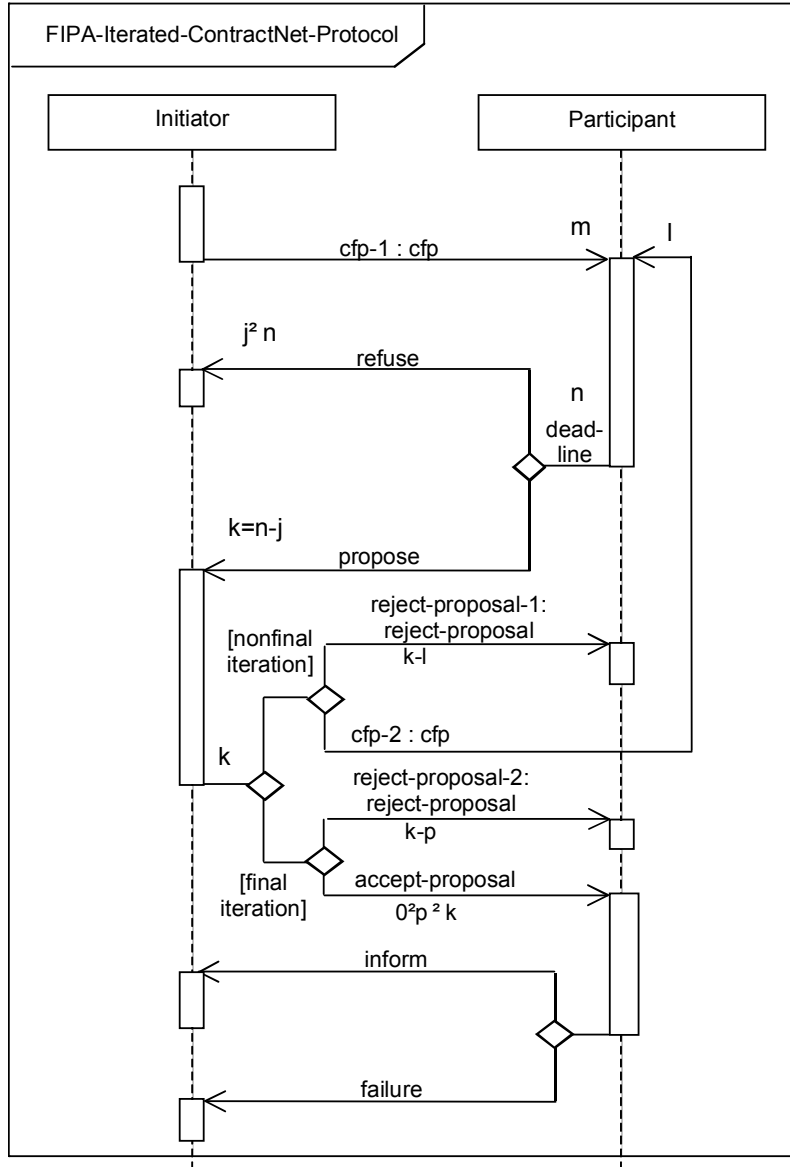
Contents

1   FIPA Iterated Contract Net Interaction Protocol

The FIPA Iterated Contract Net Interaction Protocol (IP) is an extension of the basic FIPA Contract Net IP (see [FIPA00029]), but it differs by allowing multi-round iterative bidding.

The representation of this IP is given in *Figure 1* which is based on extensions to UML1.x. [Odell2001]. This protocol is identified by the token fipa-iterated-contract-net as the value of the protocol parameter of the ACL message.

Figure 1: FIPA Iterated Contract Net Interaction Protocol

1.1   Explanation of the Protocol Flow

As with the FIPA Contract Net IP, the Initiator issues *m* initial call for proposals with the cfp act (see [FIPA00037]). Of the *n* Participants that respond, *k* are propose messages (see [FIPA00037]) from Participants that are willing and able to do the task under the proposed conditions and the remaining *j* are from Participants that refuse.

63 Of the *k* proposals, the Initiator may decide this is the final iteration and accept *p* of the bids *(0 p k)*, and reject the
64 others. Alternatively the Initiator may decide to iterate the process by issuing *a* revised `cfp` to *l* of the Participants and
65 rejecting the remaining *k-l* Participants. The intent is that the Initiator seeks to get better bids from the Participants by
66 modifying the call and requesting new (equivalently, revised) bids. The process terminates when the Initiator refuses all
67 proposals and does not issue a new `cfp`, the Initiator accepts one or more of the bids or the Participants all refuse to
68 bid.
69
70 Any interaction using this interaction protocol is identified by a globally unique, non-null `conversation-id` parameter,
71 assigned by the Initiator. The agents involved in the interaction must tag all of its ACL messages with this conversation
72 identifier. This enables each agent to manage its communication strategies and activities, for example, it allows an
73 agent to identify individual conversations and to reason across historical records of conversations.
74
75 In the case of 1:N interaction protocols or sub-protocols the Initiator is free to decide if the same `conversation-id`
76 parameter should be used or a new one should be issued. Additionally, the messages may specify other interaction-
77 related information such as a timeout in the `reply-by` parameter that denotes the latest time by which the sending
78 agent would like to have received the next message in the protocol flow.
79

80 ## 1.2 Exceptions to Interaction Protocol Flow

81 At *any* point in the IP, the receiver of a communication can inform the sender that it did not understand what was
82 communicated. This is accomplished by returning a `not-understood` message. As such, *Figure 1* does not depict a
83 `not-understood` communication as it can occur at any point in the IP. The communication of a `not-understood`
84 within an interaction protocol may terminate the entire IP and termination of the interaction may imply that any
85 commitments made during the interaction are null and void. However, since this IP broadcasts to more than one
86 Participant, multiple responses are also possible. Each response, then, must be evaluated separately – and some of
87 these responses might be `not-understood`. However, terminating the entire IP in this case might not be appropriate,
88 as other Participants may be continuing with their sub-protocols.
89
90 At any point in the IP, the initiator of the IP may cancel the interaction protocol by initiating the meta-protocol shown in
91 *Figure 2*. The `conversation-id` parameter of the cancel interaction is identical to the `conversation-id` parameter
92 of the interaction that the Initiator intends to cancel. The semantics of cancel should roughly be interpreted as meaning
93 that the initiator is no longer interested in continuing the interaction and that it should be terminated in a manner
94 acceptable to both the Initiator and the Participant. The Participant either informs the Initiator that the interaction is done
95 using an `inform-done` or indicates the failure of the cancellation using a `failure`.
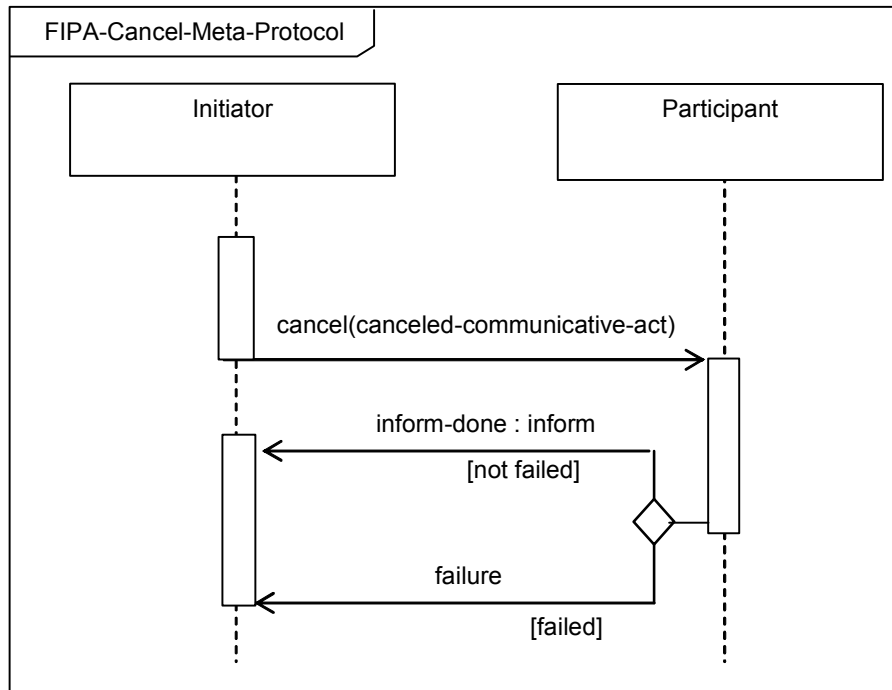96

97
98   **Figure 2:** FIPA Cancel Meta-Protocol
99
100   This IP is a pattern for a simple interaction type. Elaboration on this pattern will almost certainly be necessary in order to
101   specify all cases that might occur in an actual agent interaction. Real world issues such as the effects of cancelling
102   actions, asynchrony, abnormal or unexpected IP termination, nested IPs, and the like, are explicitly not addressed here.
103

2 References

104

105 [FIPA00029] FIPA Contract Net Interaction Protocol Specification. Foundation for Intelligent Physical Agents, 2000.
106 `http://www.fipa.org/specs/fipa00029/`
107 [FIPA00037] FIPA Communicative Act Library Specification. Foundation for Intelligent Physical Agents, 2000.
108 `http://www.fipa.org/specs/fipa00037/`
109 [Odell2001] Odell, James, Van Dyke Parunak, H. and Bauer, B., *Representing Agent Interaction Protocols in UML*.
110 In: Agent-Oriented Software Engineering, Ciancarini, P. and Wooldridge, M., Eds., Springer, pp. 121-
111 140, Berlin, 2001.
112 `http://www.fipa.org/docs/input/f-in-00077/`
113

114 3   Informative Annex A — ChangeLog

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115 3.1   2002/11/01 - version G by TC X2S

116	Page 1, Figure 1:	The `not-understood` communication was removed
117	Page 1, Figure 1:	To conform to UML 2, the protocol name was placed in a boundary, x is removed from the
118		diamonds (xor is now the default) and the template box was removed
119	Page 1, line 42:	Reworked and expanded the section description of the IP
120	Page 1, line 57:	Added a new section on Explanation of Protocol Flow
121	Page 1, line 57:	Reworked and expanded the section on Exceptions of Protocol Flow to incorporate a meta-
122		protocol for cancel
123	Page 1, line 57:	Added a paragraph explaining the `not-understood` communication and its relationship with
124		the IP
125		