FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

FIPA Query Interaction Protocol Specification

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Foreword

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1 FIPA Query Interaction Protocol

The FIPA Query Interaction Protocol (IP) allows one agent to request to perform some kind of action on another agent.

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-query` as the value of the `protocol` parameter of the ACL message.

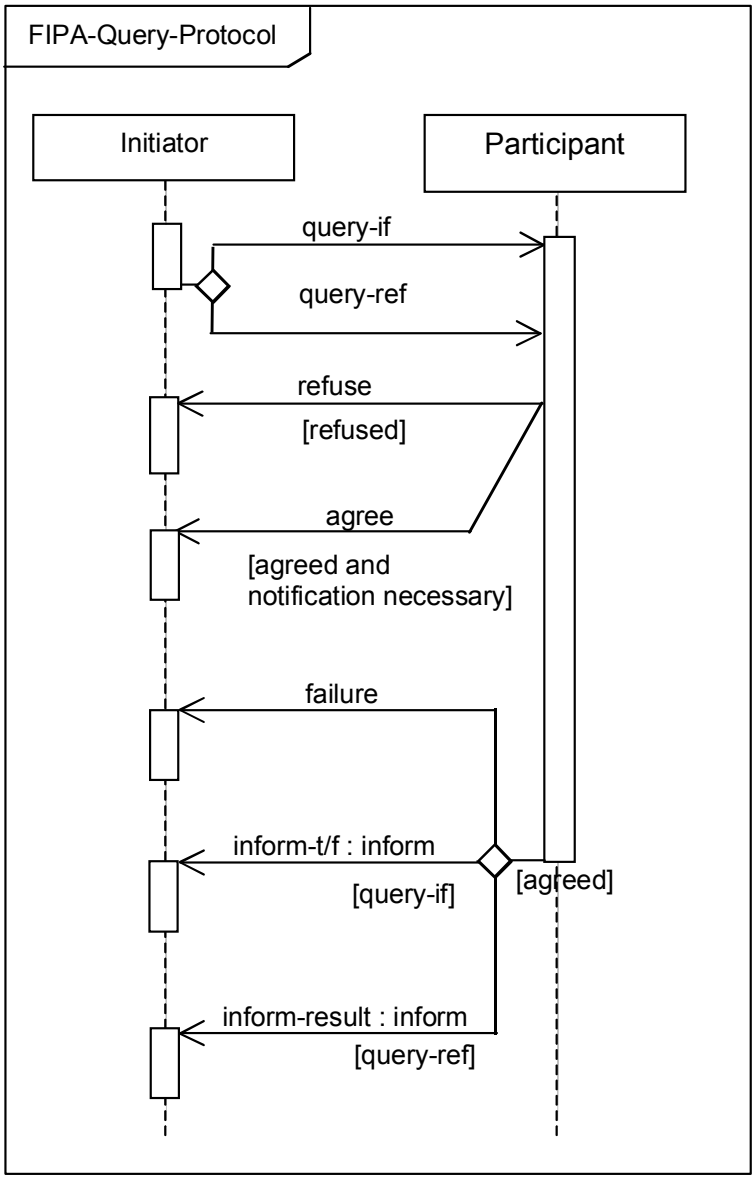

Figure 1: FIPA Query Interaction Protocol

1.1 Explanation of the Protocol Flow

The Initiator requests the Participant to perform some kind of `inform` action using one of two query communicative acts, `query-if` or `query-ref` (see [FIPA00037]). The `query-if` communication is used when the Initiator wants to query whether a particular proposition is true or false and the `query-ref` communication is used when the Initiator wants to query for some identified objects. The Participant processes the `query-if` or `query-ref` and makes a decision whether to accept or refuse the query request. If the Participant makes a refuse decision, then “refused” becomes true and the Participant communicates a `refuse`. Otherwise, “agreed” becomes true.

If conditions indicate that an explicit agreement is required (that is, “notification necessary” is true), then the Participant communicates an `agree`. The `agree` may be optional depending on circumstances, for example, if the requested action is very quick and can happen before a time specified in the `reply-by` parameter. If the Participant fails, then it communicates a `failure`.

In a successful response, the Participant replies with one of two versions of `inform`:

- The Participant uses an `inform-t/f` communication in response to a `query-if` where the content of the `inform-t/f` asserts the truth or falsehood of the proposition, or,

- The Participant returns an `inform-result` communication in response to a `query-ref` and the content of the `inform-result` contains a referring expression to the objects for which the query was specified.

Any interaction using this interaction protocol is identified by a globally unique, non-null `conversation-id` parameter, assigned by the Initiator. The agents involved in the interaction must tag all of its ACL messages with this conversation identifier. This enables each agent to manage its communication strategies and activities, for example, it allows an agent to identify individual conversations and to reason across historical records of conversations.

1.2 Exceptions to Interaction Protocol Flow

At *any* point in the IP, the receiver of a communication can inform the sender that it did not understand what was communicated. This is accomplished by returning a `not-understood` message. As such, *Figure 1* does not depict a `not-understood` communication as it can occur at any point in the IP. The communication of a `not-understood` within an interaction protocol may terminate the entire IP and termination of the interaction may imply that any commitments made during the interaction are null and void.

At any point in the IP, the initiator of the IP may cancel the interaction protocol by initiating the meta-protocol shown in *Figure 2*. The `conversation-id` parameter of the cancel interaction is identical to the `conversation-id` parameter of the interaction that the Initiator intends to cancel. The semantics of cancel should roughly be interpreted as meaning that the initiator is no longer interested in continuing the interaction and that it should be terminated in a manner acceptable to both the Initiator and the Participant. The Participant either informs the Initiator that the interaction is done using an `inform-done` or indicates the failure of the cancellation using a `failure`.

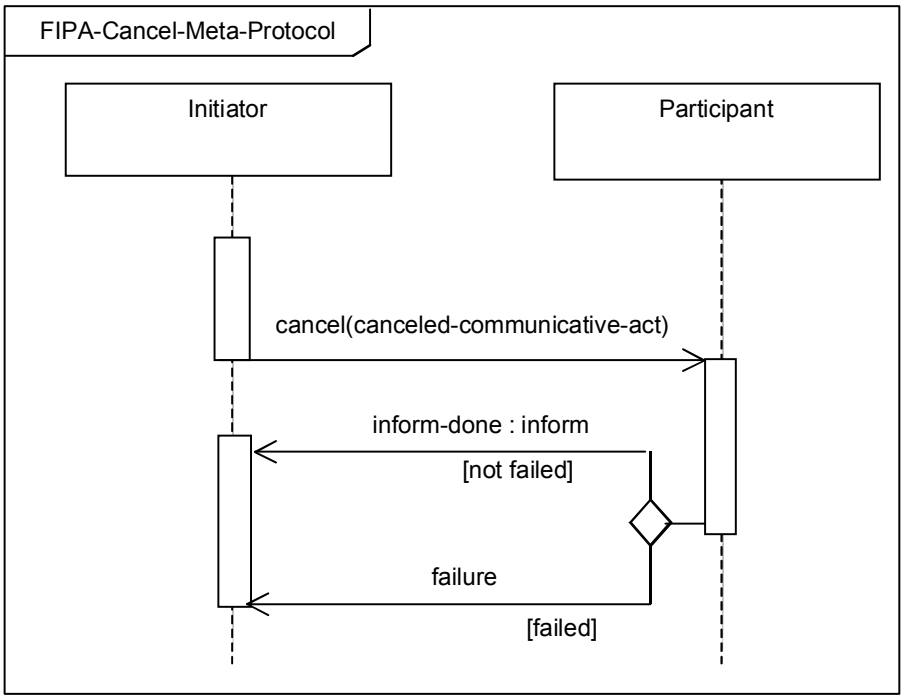

Figure 2: FIPA Cancel Meta-Protocol

This IP is a pattern for a simple interaction type. Elaboration on this pattern will almost certainly be necessary in order to specify all cases that might occur in an actual agent interaction. Real world issues such as the effects of cancelling actions, asynchrony, abnormal or unexpected IP termination, nested IPs, and the like, are explicitly not addressed here.

2 References

[FIPA00037] FIPA Communicative Act Library Specification. Foundation for Intelligent Physical Agents, 2000. http://www.fipa.org/specs/fipa00037/

[Odell2001] Odell, James, Van Dyke Parunak, H. and Bauer, B., *Representing Agent Interaction Protocols in UML*. In: Agent-Oriented Software Engineering, Ciancarini, P. and Wooldridge, M., Eds., Springer, pp. 121-140, Berlin, 2001. http://www.fipa.org/docs/input/f-in-00077/

3 Informative Annex A — ChangeLog

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

Page 1, Figure 1: The `not-understood` communication was removed

Page 1, Figure 1: Reworked the protocol flow to make the agree optional and made explicit the different inform response content expected for a `query-if` as opposed to a `query-ref`

Page 1, Figure 1: To conform to UML 2, the protocol name was placed in a boundary, x is removed from the diamonds (xor is now the default) and the template box was removed

Page 1, line 42: Reworked and expanded the section description of the IP

Page 1, line 54: Added a new section on Explanation of Protocol Flow

Page 1, line 54: Reworked and expanded the section on Exceptions of Protocol Flow to incorporate a meta-protocol for cancel

Page 1, line 54: Added a paragraph explaining the `not-understood` communication and its relationship with the IP

3.2 2002/12/03 - version H by FIPA Architecture Board

Entire document: Promoted to Standard status