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5 # FIPA Contract Net Interaction Protocol
6 # Specification

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Foreword

The Foundation for Intelligent Physical Agents (FIPA) is an international organization that is dedicated to promoting the industry of intelligent agents by openly developing specifications supporting interoperability among agents and agent-based applications. This occurs through open collaboration among its member organizations, which are companies and universities that are active in the field of agents. FIPA makes the results of its activities available to all interested parties and intends to contribute its results to the appropriate formal standards bodies.

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 Procedures for Technical Work. A complete overview of the FIPA specifications and their current status may be found in the FIPA List of Specifications. A list of terms and abbreviations used in the FIPA specifications may be found in the FIPA Glossary.

FIPA is a non-profit association registered in Geneva, Switzerland. As of January 2000, the 56 members of FIPA represented 17 countries worldwide. Further information about FIPA as an organization, membership information, FIPA specifications and upcoming meetings may be found at http://www.fipa.org/.

Contents

1 FIPA Contract Net Interaction Protocol

This specification presents a version of the widely used Contract Net Protocol, originally developed by Smith and Davis. The FIPA Contract Net Interaction Protocol (IP) is a minor modification of the original contract net IP pattern in that it adds rejection and confirmation communicative acts. In the contract net IP, one agent takes the role of manager which wishes to have some task performed by one or more other agents and further wishes to optimise a function that characterizes the task. This characteristic is commonly expressed as the price, in some domain specific way, but could also be soonest time to completion, fair distribution of tasks, etc.

The manager solicits proposals from other agents by issuing a *call for proposals* act (see [FIPA00037]), which specifies the task, and any conditions the manager is placing upon the execution of the task. Agents receiving the call for proposals are viewed as potential contractors and are able to generate proposals to perform the task as *propose* acts (see [FIPA00037]). The contractor's proposal includes the preconditions that the contractor is setting out for the task, which may be the price, time when the task will be done, etc. Alternatively, the contractor may *refuse* (see [FIPA00037]) to propose. Once the deadline passes, the manager evaluates any received proposals and selects agents to perform the task; one, several or no agents may be chosen. The agents of the selected proposal(s) will be sent an *accept-proposal* act (see [FIPA00037]) and the others will receive a *reject-proposal* act (see [FIPA00037]). The proposals are binding on the contractor, so that once the manager accepts the proposal, the contractor acquires a commitment to perform the task. Once the contractor has completed the task, it sends a completion message to the manager.

Note that this IP requires the manager to know when it has received all replies. In the case that a contractor fails to reply with either a *propose* or a *refuse* act, the manager may potentially be left waiting indefinitely. To guard against this, the *call for proposal* includes a deadline by which replies should be received by the manager. Proposals received after the deadline are automatically rejected with the given reason that the proposal was late.
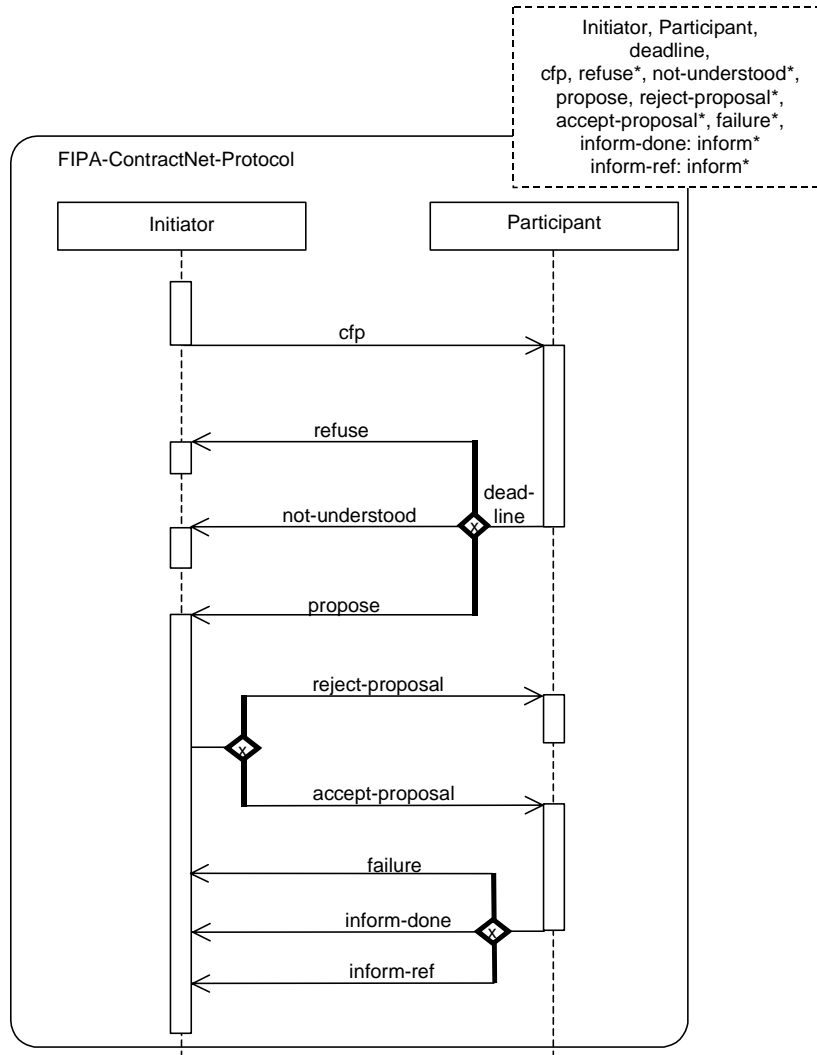
The representation of this IP is given in *Figure 1*.

Figure 1: FIPA Contract Net Interaction Protocol

1.1   Exceptions to Interaction Protocol Flow

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 of cancelling actions, asynchrony, abnormal or unexpected IP termination, nested IPs, and the like, are explicitly not addressed here.

77 **2 References**

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