

# FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

## FIPA Contract Net Interaction Protocol Specification

<b>Document title</b>	FIPA Contract Net Interaction Protocol Specification		
<b>Document number</b>	XC00029E	<b>Document source</b>	FIPA TC C
<b>Document status</b>	Experimental	<b>Date of this status</b>	2001/01/29
<b>Supersedes</b>	None		
<b>Contact</b>	fab@fipa.org		
<b>Change history</b>			
2001/01/29	Approved for Experimental		

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## Foreword

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## 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*.

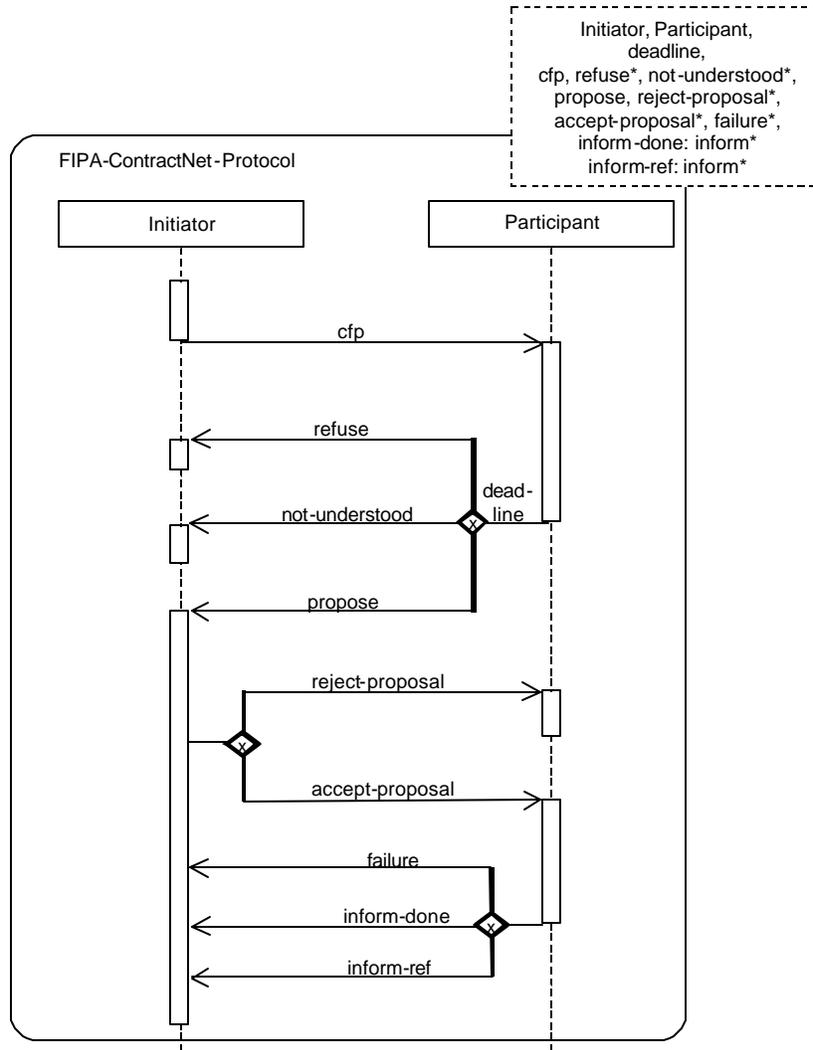


Figure 1: FIPA Contract Net Interaction Protocol

### 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.

## 2 References

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