[WD] Mech Marketplace description and contracts overview

Summary: This document outlines the core workflow of the Mech Marketplace, detailing the roles and interactions of key participants. It also provides an in-depth overview of the smart contracts that facilitate and govern transactions within the platform.

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1. Overview

The Mech Marketplace allows:

- any agent registered on Olas ServiceRegistry create its corresponding Mech on the Mech Marketplace in order to deliver task-based services;
- any account to request some task executions from Mechs registered on the Mech Marketplace.

This document provides an overview of the workflow Mech Marketplace interacts with and describes the Mech Marketplace contracts located here.

2. Workflow

An agent performing task-based services, is registered and deployed in Olas ServiceRegistry and has a specified serviceId. We refer to such agents as Mech services. These Mech services can be registered in the MechMarketplace contract, which triggers the deployment of a Mech contract associated with the given serviceId [this is illustrated on **Fig. 1**]. Once deployed, these Mechs are available for task execution through the MechMarketplace.

A requester is the party[1] that submits the task execution to a Mech. The submission can be done in two different ways:

1. On-chain requests [Fig. 2 & Fig. 3]

[1] A requester can either be an EOA or a multisig. When the requester deliberately specifies a serviceID while making a request via the Mech Marketplace, the multisig associated with that serviceID will be responsible for covering the cost of task execution.

The on-chain option can be done by sending the request to the MechMarketplace, specifying the serviceId of the mech they wish to engage for the execution of the task. This Mech is referred to as a 'priority Mech'. The requester also specifies a responseTimeout[2], which is the time they expect the priority Mech to deliver the task for. In order to submit a request, a payment must be made, which covers the cost of the task execution as well as a protocol fee. Payments are managed through the Balance Tracker contracts, which track and handle payments made in either native tokens, ERC20 tokens, or via subscriptions, depending on the Mech's payment model, and check that funds of the requester are sufficient. If it is the case, the request is relayed to the priority Mech.

If the priority Mech completes the task within the designated responseTimeout, it is rewarded with a positive Karma score. If the Mech fails to meet the timeline, it is penalized with a negative Karma score. In such cases, any other Mech can step in to fulfill the task, and the first Mech doing so receives a positive Karma score for execution of the task.

2. Off-chain requests [Fig. 4]

The on-chain option can be done by sending a request with a signature directly to a Mech service off-chain. In this case, the delivery must be already pre-paid, such that the requester has a balance tracker balance covering all the signed requests. Otherwise the delivery is rejected. The Mech can then deliver on-chain with the requester signature, gets its payment via the Balance Tracker contract and gets rewarded with a positive Karma score. In this situation, there is no deadline and no other Mech can take-over if the Mech fails to deliver (in particular no Mech receives a negative Karma score).

In both cases, Mech payments for requested task executions are collected in the Balance Tracker contract, and Mechs can collect payment for delivered executions from the Balance Tracker. A portion of the payment is retained by the Balance Tracker for DAO management, which can later be drained into the DAO chosen drainer by any account [this is illustrated on **Fig. 5**]. The exact payment structure (fixed or dynamic pricing) and the tokens used for payment depend on the Mech's pre-set payment model.

[2] In order to have responseTimeout being reasonably selected this value is bounded below and above by values specified by the Mech Marketplace

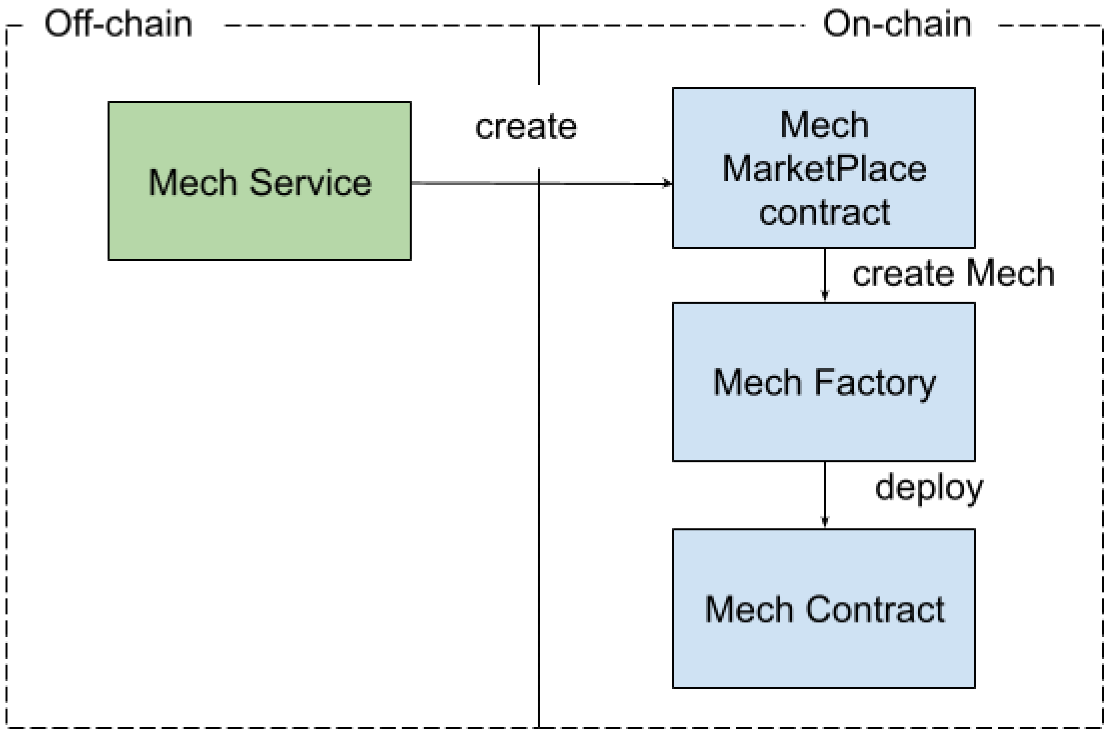

Fig. 1. Mech Service registration on the Mech Marketplace contract with an on-chain transaction. Mech Contract deployment is triggered.

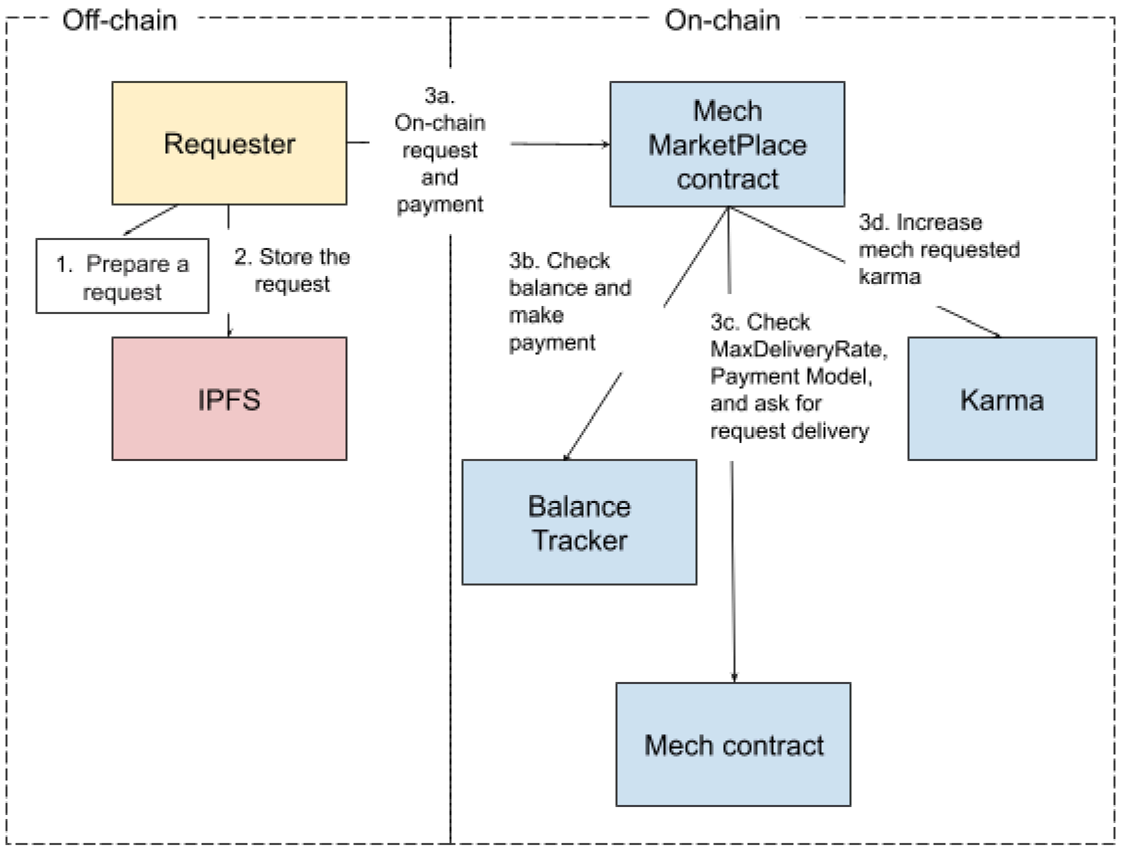
Off-chain
On-chain
Requester
1. Prepare a request
2. Store the request
IPFS
3a. On-chain request and payment
Mech MarketPlace contract
3b. Check balance and make payment
Balance Tracker
3c. Check MaxDeliveryRate, Payment Model, and ask for request delivery
Mech contract
3d. Increase mech requested karma
Karma

Fig. 2. Requester sending on-chain requests to the Mech via the Marketplace. Note that the only on-chain request transaction (3a), also triggers 3b, 3c, and 3d.

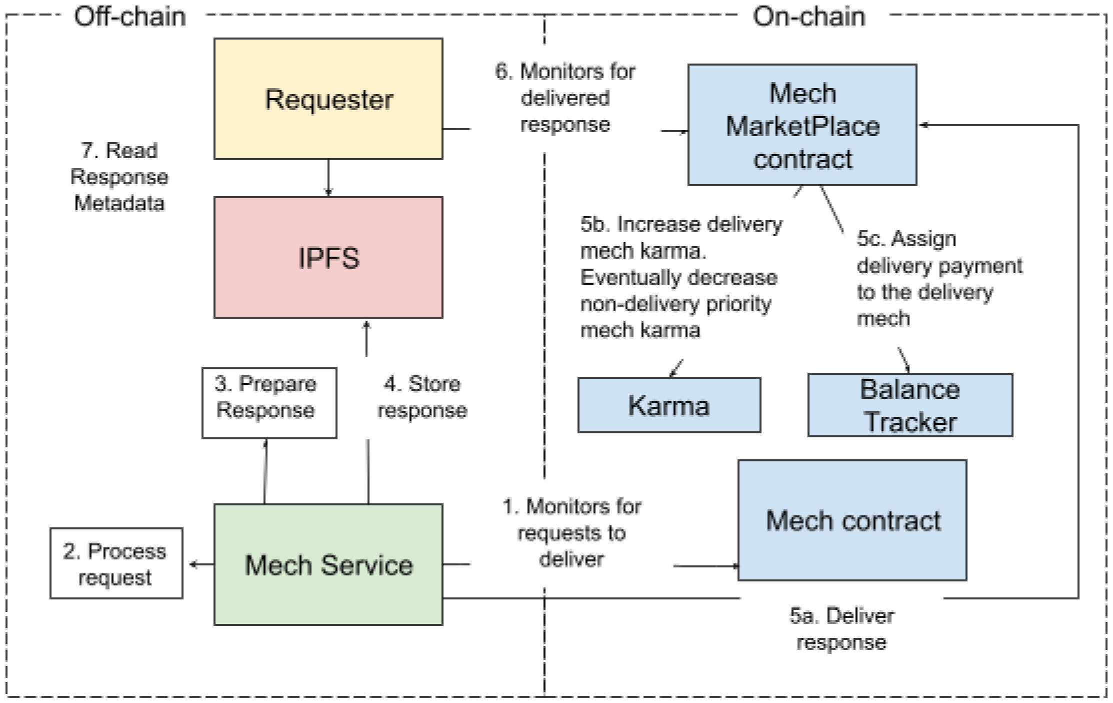
Off-chain
On-chain
Requester
6. Monitors for delivered response
Mech MarketPlace contract
7. Read Response Metadata
IPFS
5b. Increase delivery mech karma. Eventually decrease non-delivery priority mech karma
5c. Assign delivery payment to the delivery mech
3. Prepare Response
4. Store response
Karma
Balance Tracker
Mech contract
1. Monitors for requests to deliver
2. Process request
Mech Service
5a. Deliver response

Fig. 3. Mech delivery response to an on-chain request via the Marketplace. Note that only on-chain request transaction (5a) also triggers 5b and 5c.

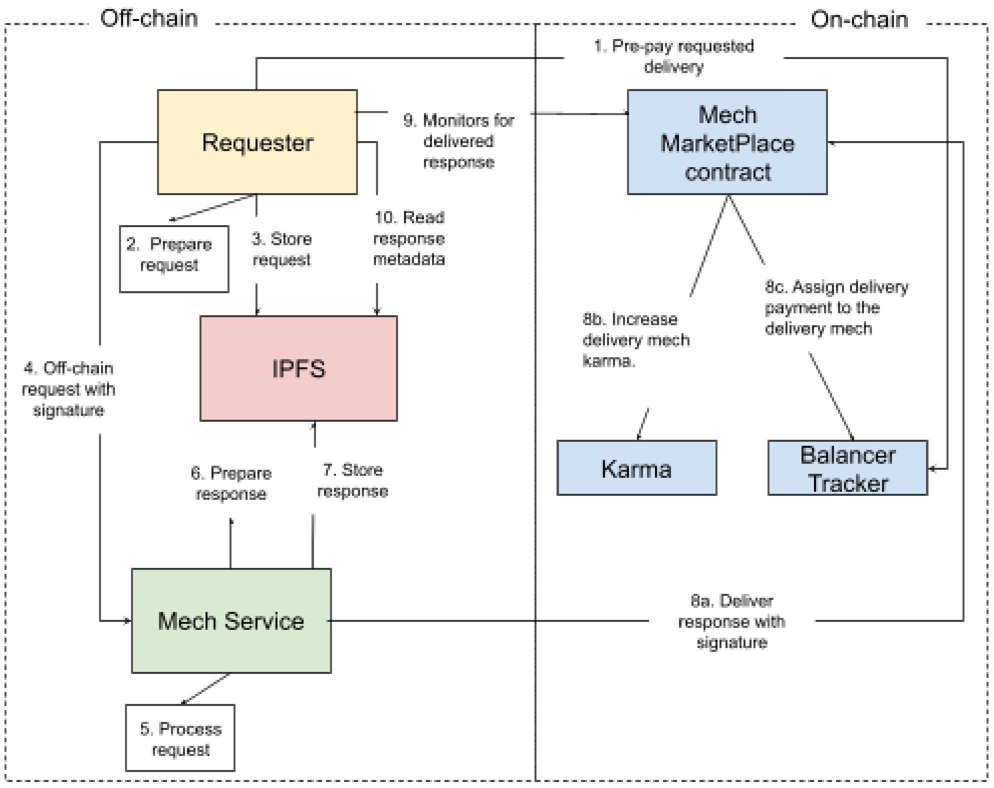
Off-chain
On-chain
1. Pre-pay requested delivery
Requester
9. Monitors for delivered response
Mech MarketPlace contract
2. Prepare request
3. Store request
10. Read response metadata
8b. Increase delivery mech karma.
8c. Assign delivery payment to the delivery mech
4. Off-chain request with signature
IPFS
6. Prepare response
7. Store response
Karma
Balancer Tracker
Mech Service
8a. Deliver response with signature
5. Process request

Fig. 4. Off-chain request with signature and mech delivery with signature workflow. Note that, despite pre-payment being marked as step 1, it only needs to happen before the on-chain mech delivering with a signature.

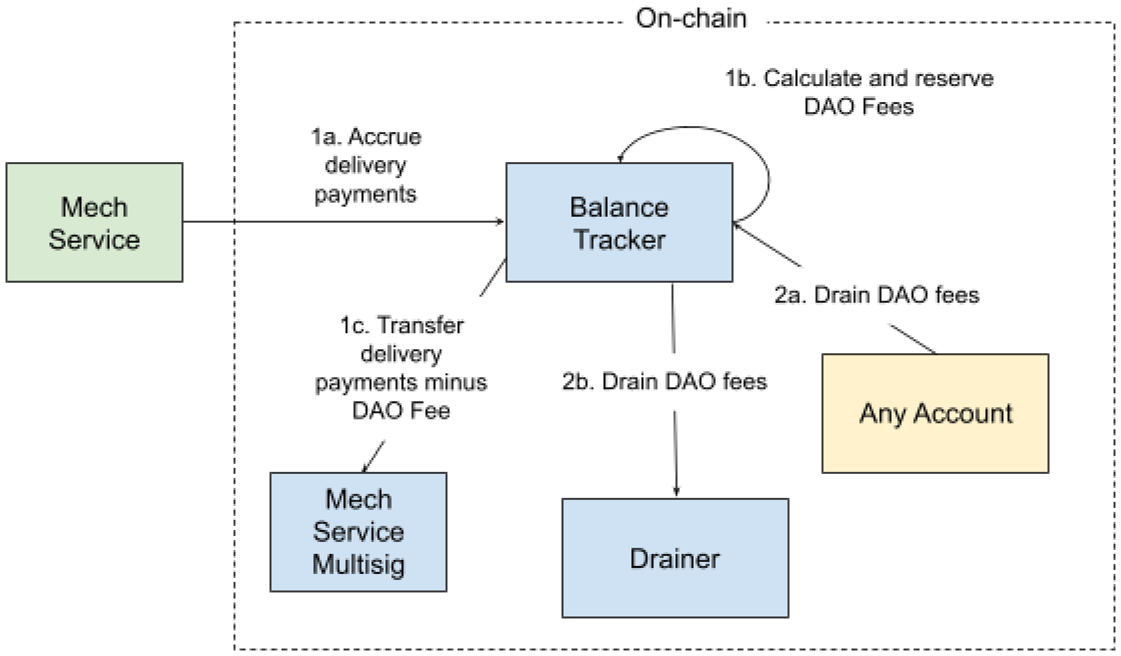

Fig. 5: On-chain flow for Mech's recovery of payments and DAO's Mech Marketplace fees. Note that the on-chain payment accrual transaction (1a) also triggers 1b and 1c, similarly, the on-chain drain call 2a also triggers 2b.

3. Description of contracts

The Mech Marketplace is constituted of on-chain contracts made up of the following components:

1. Mech contracts receive requests and payments from requesters via the Mech Marketplace contract and respond to these requests through it;
2. Mech Factory contracts enable the creation and deployment of Mech contracts;
3. Balance Trackers are requesters' and Mechs' accounts in the Mech Marketplace storing mechs'/requesters' balances; Mechs are able to withdraw their balances at any time; requesters are not allowed to withdraw their balances, just to use them for posting requests; when mechs payment processing happens, the Mech Marketplace takes a

share which is accumulated in its balance in the Balance tracker, and can be withdrawn at any time;

4. The Mech Marketplace contract relays requests from requesters to Mechs, handles the competition between Mechs and checks that the amount available on each requester’s balance is enough to relay a request to a Mech.
5. The Karma contract maintains and updates a reputation score of Mechs;