Service Discovery and Session Initiation in a Highly Dynamic Swarm of Unmanned Vehicles
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This research project takes place in a mobile and highly volatile network of unmanned vehicles. Several nodes of this network can provide various services, like heat sensor, infrared camera, long range communications antenna, etc. Service discovery is the capability for a node to locate a service hosted by another node.

For instance, in Figure 1, one UAV (Unmanned Aircraft Vehicle) is using the camera service of another UAV.

In this work, we propose a hybrid and adaptable service discovery model which combines a semi-active method (DHT) and a semi-passive technique (Service Token) in order to get an efficient solution for highly mobile and volatile networks.

A virtual element, the token [6], circulates through the whole network, gathering services information. Nodes update their local services localization table dynamically when the token passes through them. This service table stores only the adjoining node to be contacted to reach the service. We ensure, at each instant, that there is exactly one token per connected component. In case of the graph splits in separate parts, new tokens are generated. In the opposite case (i.e. components fusion), tokens have to be merged. This technique can be considered as semi-active because even if services localization information are stored in the cache of the nodes, a multi-hop forward mechanism is used to reach services.

Figure 2 illustrates the service token in action:

In order to evaluate our system, we will use two different testbeds.

NEmu [8] is a distributed virtual testbed which emulates a virtual dynamic network in order to perform experimentation on real application code. Figure 4 provides an illustration of such a virtual network:

SCUAL [9] is a swarm of nano quadrotors UAVs acquired from the Fly-n-Sense company (Merignac). Figure 5 is a picture of this swarm of UAVs.

**Context**

This research project takes place in a mobile and highly volatile network of unmanned vehicles. Several nodes of this network can provide various services, like heat sensor, infrared camera, long range communications antenna, etc. Service discovery is the capability for a node to locate a service hosted by another node.

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**Goal**

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**Test Platforms**

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**Bibliography**