Distributed Resource Allocation, An Experimentation and Demonstration Framework for Algorithm Evaluation

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Scenario

The various elements of a deployed task force will have different computational capabilities and levels of connectivity.

This demonstration shows a Delay Tolerant Network (DTN) coupled with local messaging transformation and queueing. Using this approach, a network that is more tolerant to node mobility can be created.

By using this network to gather relevant node characteristics, various experimental optimizations (from DAIS projects 1 and 3) can then provide a suggested deployment of applications to best suit users and the current processing availability. This experimentation facility allows us to measure the impact on resource usage of the various algorithms in a controlled manner.

Details

A variety of mobile nodes are simulated, including sensors, personnel land and air vehicles, as well as fixed bases, each with differing comms capabilities. All except for the sensors have the ability to execute tasks but have differing compute capability. Each compute node runs a DTN router, and an event processing engine (Node-RED), which also gathers local capability information to pass to the optimisation engines. The emulation allows for dynamic mobility of nodes such that the dynamic re-optimization of resources can occur.

Experimental optimisations from other DAIS projects are then performed in either a central or more distributed manner, and the resulting tasks allocated across the available nodes and network as appropriate.

This framework is intended to be used as the basis for ongoing experimentation, with the aim of deploying this approach on real next generation service equipment and in service bearers.

Enhancements to CORE

New emulation services had to be developed and these will be donated back to the open source project (once approved).

- DTN Daemon
- DTN Tunnel
- DTN Sink
- Paho MQTT Broker
- MQTT-SN (QoS -1)
- Node-RED
- ONOS (not used)