**Message Flow: Task Planning, Assignment, and Execution (5/24/2017)**

Participants: ControlInterface, AutomationRequestValidator, TaskManager, RouteAggregator, RoutePlannerVisibility, AssignmentTreeBranchBound, PlanBuilder, WaypointManager, AMASE

## Initialization

[Entity Configurations]
[Entity States]
[Keep In/Out Zones]
[Operating RegionS]
[Task]

New Tasks are sent:
- TaskConfiguration
- All EntityConfigurations
- All EntityStates
- Point, Line, or Area
  of interest, when required

new(Task)

Task

[TaskInitialized]

## Assignment

[AutomationRequest]
[UniqueAutomationRequest]

Store AutomationRequest for future
cost matrix calculations.
points.

For each eligible entity, calculate the
planning points required to calculate
task costs:
1) Request sensor footprint information
for all eligible vehicles (if required)
2) Find task options and composition.
3) For each option, calculate planning

[RouteRequest](cost only)

Based on entity requirements, send
requests to planners to calculate
costs for all of the task options.

[RoutePlanRequest](cost only)
[RoutePlanResponses](cost only)
[RouteResponse](cost only)

4) Send options and composition.

[TaskPlanOptions]

After receiving all TaskPlanOptions
(requested in the AutomationRequest)
request costs for plans from each entity
to each eligible task and from each task
to every other task.

[RoutePlanRequest](cost only)
[RoutePlanResponses](cost only)
[AssignmentCostMatrix]

The assignment is calculated once
the AssignmentCostMatrix and the Task
Plan Costs, from all of the requested
tasks, are received.

[TaskAssignmentSummary]

## Implementation

Constructs plans by:
1) For each assigned task option,
calculate final task plan.

[TaskImplementationRequest]

1) Construct final plans
2) Cache assignment for use during
execution

[RoutePlanRequest]
[RoutePlanResponses]
[RouteResponse]

[RouteRequest]

[TaskImplementationResponse]

2) Based on assigned order of task
options, construct waypoint plans and
send automation response.

[UniqueAutomationResponse]
[AutomationResponse]

## Execution

[AirVehicleState](UAV01)
[MissionCommand](UAV01)

Tasks monitor VehicleStates to act
on assigned portions of the plan,
e.g., starts recording video based
on vehicle state

[VehicleActionCommand](UAV01)
[TaskComplete]