# Swarm Idea Title

## BASIC CONOP AND DESIGN DOCUMENT
STEPHEN PONDER

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# Swarm Concept

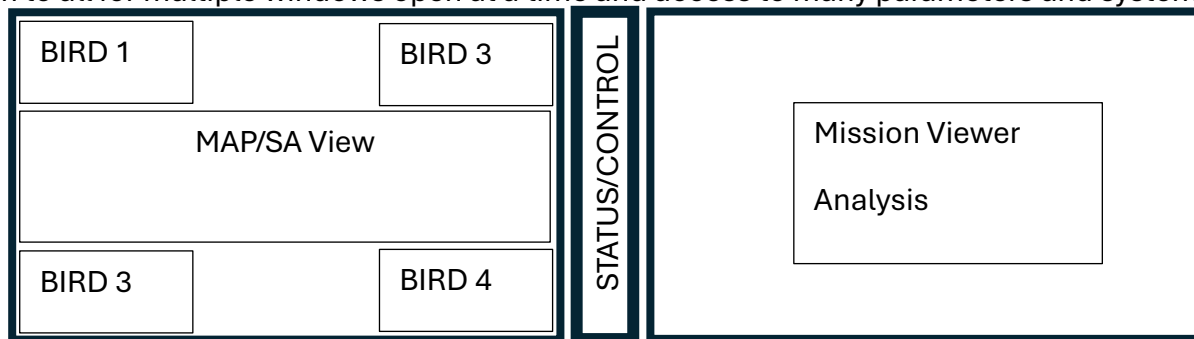Mesh swarm of ISR/Light strike mission, combination fo multirotor and fixed wing swarm

# Basic Description

4 fixed wing 4 multi rotor and 2 mini strike weapons

Each system will work on a wifi HALO mesh, ELRS, analog VTX, have a companinon computer, camera, sdr, full duplex capabilities, lidar, laser range finder, GPS, RTK and cellular modem

# GCS Ideas

A two screen GCS with a control/status panel in the middle. Ideally deployed in austere environments. Able to control all elements of the swarm from these screens. Ideally a window style program to all for multiple windows open at a time and access to many parameters and systems.

| BIRD 1 | | BIRD 3 | STATUS/CONTROL | | |
|--------|--|--------|----------------|--|--|
| MAP/SA View | | | | Mission Viewer Analysis | |
| BIRD 3 | | BIRD 4 | | | |

# Basic System Description

## Bird

Fixed wing UAV with mobile launch and open architecture designed with future system upgrades in mind. Gas/Jet A Powered system that has a 5-6 hour loiter time. Triple redundant FC system, Jetson nano companion computer, ELRS RC link, Starlink mini, WiFi mesh management node, EO/IR gimbaled camer, LIDAR, RTK station, LRF, 4G modem, High power SDR, broadband antennas

## Chick

Multirotor, upgradable, disposable, Elecgtrical powered, lithium ion batter, 5 in quadrotor, 2 axis gimbaled camera, Laser range finder, Lidar, real time kinematics rx, SDR rx, ELRS, Cellular modem, Camera, Analog VTX, Lightweight Companion computer, WiFi HALO hardware

## Orb

Small, droppable, guided drop package, ESP32 control, GPS, IMU, control fins, room for expansion to eventually, have simple, light image recognition

## Basic Mesh Flow

1.1.1. Read as if a part is destroyed or lost, what the system should attempt to do

Starlink

Large UAS WiFi HALO Hub

Smaller Limited Chick Hub, low power

Attempt to 4G connect

Autonomous RTL

Destructive Termination

## ConOp

1. Launch and Fly
   a. 4 ship of drones is launched from site, Initial systems health is verified. Large datasets are downloaded prior to launch. Bird establishes communication with the chicks to verify their health. Chicks talk to Orbs to confirm their health
2. Mission Tasking
   a. After launch, user arms the mission, the formation will begin its transit to the destination
3. Transit
   a. The formation will transit to the area of interest. Threats to the mission will be defined in the GCS or as determined by the threat algorithms of the Birds in flight or if any chicks are deployed and determine a threat exists, then that will additionally trigger a threat. The GCS operator can override these if mission requirements demand it.
4. F2T2
   a. Birds will execute mission as programed. Birds will release chicks as required depending on the mission type at hand. Target coordinated can be determined by the user or can be determined by the system depending on what level of autonomy is being explored. Machine learning will be employed to track targets and target as required with consent from the GCS operator
5. EA
   a. Once the mission is complete, chicks will check the work. If all chicks are depleted, then birds will check the work. If all this is completed, the birds will initiate an RTB. Dynamic targeting can also be accepted at this time.
6. RTB

a. 4 ship returns to base navigating any hazards and issues. Birds are refueled and reloaded. Mission data is downloaded and analyzed in the GCS. Data is passed. Next mission prep begins

# Cost and Timeline

Prototype 2 Birds, 2 Chicks, 4 Orbs, 6 months

   Bird - $3,000 per ship (no starlink, electric prototype)

   Chick - $500 per drone (use RPI, Skip 4G link)

   Orb  - $250 per orb

Initial Design Target - $200,000 per system, One Year

   Bird - $10,000 per ship (4)

   Chick - $1,000 per drone (4)

   Orb  - $250 per orb

   GCS and other - $50,000

   Logistics and Transport -  $50,000

# What I want

Abstract/Summary

Component description/BOM

GCS breakout

Basis CONOP

Specific System Breakdown

Cost and Timeline

Systems interface Plan + Network Design Document

Final Execution Summary