**Scope**
- Develop and demonstrate an integrated range and bearing acquisition (coarse) sensor.

**Key Requirements**
- Operating range: 16 m to 1 km
- Key performance requirements:
  - bearing: 1 degree (1 s)
  - range: 50 cm (1 s)
  - instantaneous 4π coverage.

**Design and Features**
**AFF (Autonomous Formation Flyer)**
- Integrated range and bearing sensor
- Single backend processor and frequency reference
- Multiple wide-field antennas for 4π steradian coverage
- Integrated radar capability for collision avoidance

A new signal structure will be developed to enable:
- An order of magnitude reduction of range error compared to what was demonstrated on the StarLight AFF sensor.
- Fine bearing angle measurement without the need for spacecraft rotation calibration maneuver.
- Fast signal acquisition for simultaneous operation of multiple spacecraft.

**Prototype Signal Generator and Receiver**

**Potential future capabilities**
- Integrated high-rate comm
- Integrated medium FF sensor
- Integrated Star Tracker
- AFF processor as S/C computer and general purpose backend processor

**Approach**
- Modify the AFF sensor to be used as the TPF acquisition sensor
- Indoor Functionality Testbed
  - HW & SW I&T
  - SW development platform
  - Functional verification
- Outdoor Articulated Testbed (with S/C mockup)
  - Validate range and bearing performance model
  - Demonstrate instantaneous coverage
  - Handover between antennas (2π steradian)
  - Extrapolate to 4π through analysis

**Preliminary Test Results**
**Test Objective:**
- Proof-of-concept demonstration of using the Binary Offset Carrier (BOC) signal to get absolute bearing angle measurement without the need for spacecraft rotation calibration maneuver. (Previous year in AFF: relative bearing angle; otherwise, calibration maneuver needed)

**Requirements:**
- 5 degree

**Summary Results:**
- Accuracy: < 2 degrees
- Precision: < 1 degree (1 s)

**Benefit for TPF:**
- Significant reduction in flight system design and operational complexity.