Marco Polo: attritable, interoperable APNT

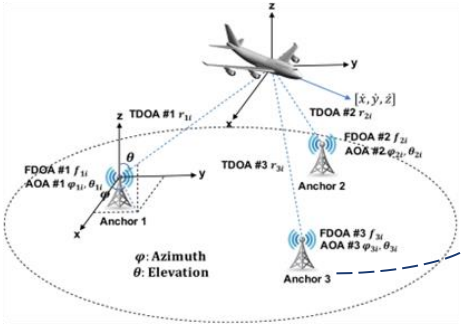
Program Overview:

- **Problem**: GPS is vulnerable: single point of failure in air assets
- Increasing need for capability to penetrate denied environments for ISR / scouting and long range precision fires among UAS, munitions
- **Solution**: low-SWAP, resilient PNT for precision navigation and targeting using proven techniques and cheap, disposable beacons
- Creates massive asymmetric economic advantages in theatre

Applications: unmanned systems, ISR-T; precision guided munitions

Current state: prototype (as of April 2024), <10m accurate at 3km range

Developing: improved accuracy, supported range; air vehicle integration





Proven technique (terrestrial multilateration), **novel approach**: Replace costly towers with cheap **disposable beacons** that deliver **sub-meter accurate positioning**, for air navigation in denied / degraded environments, all conditions

Status of capability: **TRL-5**; Brief description: dual-use positioning for precision navigation and targeting in GPS-denied environments

Differentiators:

- **Scalable deployment**: low-cost, low-SWAP, interoperable
- **Rapid development, capital light**: 6 mos prototype to field
- **Asymmetric advantage in combat**: impractical to detect and defeat given manpower and resources required
- **Open systems design**: compatible with GPS, other alt-PNT system

Comparative advantage over existing alt-PNT systems on cost, speed to market, physical SWAP and capabilities.

Dual-use application:

Defense: assets with a need for low-SWAP, low-cost resilient PNT:

Army: AH-64, UH-60, Excalibur, loitering munitions; **Air Force / Navy**: LRASM, JDAM, JSOW, JASSM; **Navy**: TLAM; **Marines**: V-BAT, RQ-21

Commercial use: dense, conflicted, urban environments

- **Public safety**: drone as first responder in dense and conflicted / remote and degraded regions
- **Urban Air Mobility**: vertiports for VTOL takeoff / landing, need redundant aerial positioning systems in dense urban environments

THIN AIR NAV www.thinairnav.com blake@thinairnav.com; +1 847.302.6888