SWIFT™-RelNav

Cluster Navigation, Communication, and Timing

TETHERS UNLIMITED

Transformative Technologies for Space, Sea, Earth, & Air

SWIFT-RelNav is a high performance software defined radio that provides clusters of small satellites with relative navigation (range and attitude), communication, and timing/frequency synchronization services.

Capabilities

SWIFT-RelNav provides clustered satellites with navigation, communication, and timing services without external references, and without any spacecraft pointing requirements. Timing and frequency can be synchronized to external references such as GPS or an atomic clock.

- Relative Range Measurements: < 0.1 m (1-σ)
- Relative Attitude Measurements: < 1.0˚ (1-σ)
- Measurement Rate: nominally 1 Hz
- Crosslink Data Rate: > 10 Mbps
- Timing Synchronization: < 10 nsec (1-σ)
- Frequency Synchronization: < 2 ppb (1-σ)
- Unlimited number of spacecraft

Unit Status

- Capabilities have been demonstrated with prototype hardware and software using ISM S-band frequencies (TRL 4)
- Compact S-band patch antennas have been designed and prototyped
- Navigation filters can be used to improve solution accuracy and precision
- Ranging and timing/frequency synchronization can be used at any frequency

Specifications

- > 1 year LEO mission design life
- ☐86 x 45mm (0.375U) w/ chassis
- 400 grams (with 4 antennas)
- Flexible mounting options
  - Flanges for deck mounting
  - Ears for CubeSat rail mounting
- 6-36V unregulated DC
  - Integrated latch-up/fault detection and protection
- Duty cycle dependent power consumption
  - Approx. 10W @ 100%
- Flexible Interfaces options including SpaceWire, RS-232/422, Clock+Data, UARTS
- Onboard AES-256/GCM encryption
  - Interface compatible with KI-55 Type-1

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