S-band Pseudolite System

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Pseudolite System

Pseudolites are most often *small transmitters* that are used to create a local Navigation System.

- ❑ Can be operated independently as a standalone system
- ❑ Can be combined with existing GNSS to
  - ➢ Improve availability
  - ➢ Improve accuracy

Parameter	GNSS	Pseudolite
Distance between Satellite Vehicle (SV) & User	Nearly 20,000-40,000 Km	5-20 Km
Clock	Atomic Clock	TCXO, OCXO….
Operational Area	Global/Regional	Small Area
SV Position	Ephemeris	Pseudolite Position
Propagation Delay	Iono & Tropo	Tropo
Raw Measurements	Code & Carrier	Code & Carrier

Design Driving Factors

❏ Service Region
- ➢ Number of Transmitters required
- ➢ Location

❏ Interference with existing bands
- ➢ RF Frequency
- ➢ EIRP
- ➢ Local regulations regarding interference mask

❏ Near-Far Problem
- ➢ Relative power difference between nearest and farthest Pseudolite

❏ Ease of integration in existing GNSS receivers
- ➢ GNSS must not be jammed by pseudolite
- ➢ Special multiple access schemes, signal structure, baseband signal processing algorithms etc.

- Standalone S-band Pseudolite System
  - ***Aircraft approach and landing operations and***
  - ***Navigation of unmanned aerial vehicles (UAV).***
- Proof of concept is demonstrated with 10 Pseudolite transceivers.
- ***Autonomous self synchronization scheme between Master and Slaves***

Hardware Development
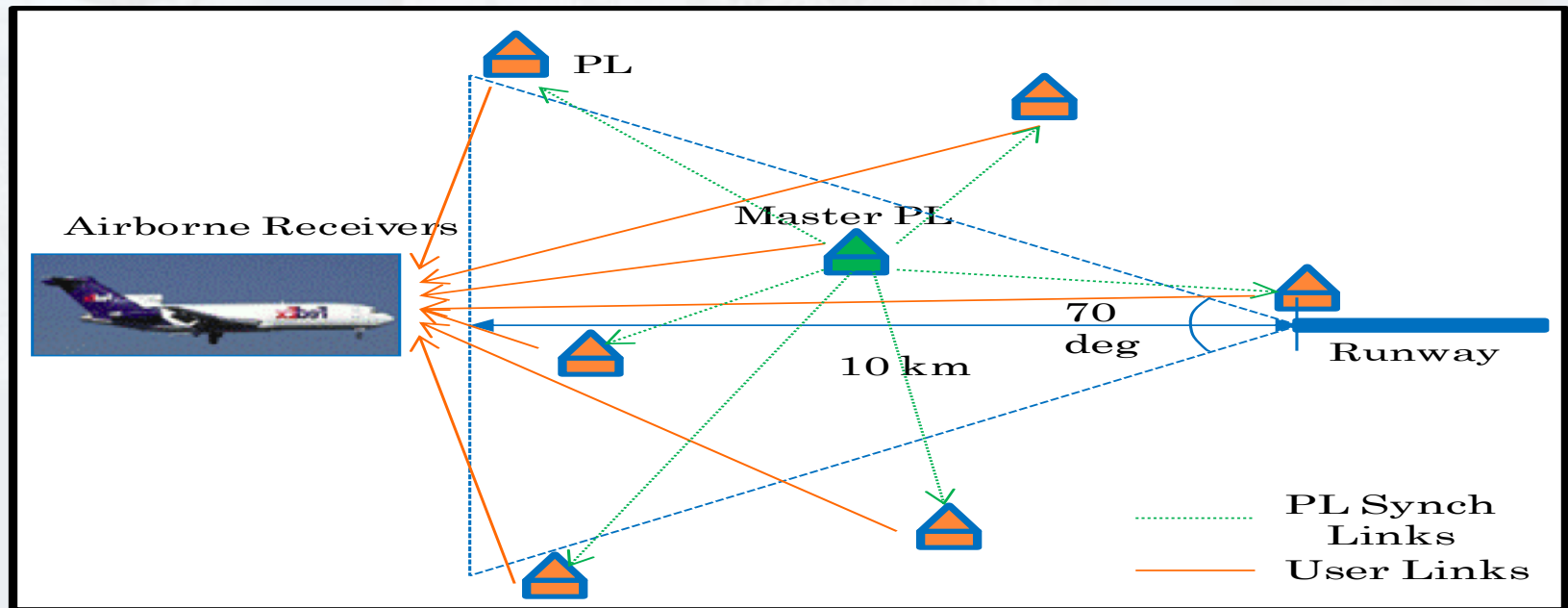
Pseudolite Tx Antenna

Pseudolite Rx Antenna

Ground Filter

Pseudolite Transmitter

Pseudolite User Receiver

On-board Filter

LNA

Power Combiner
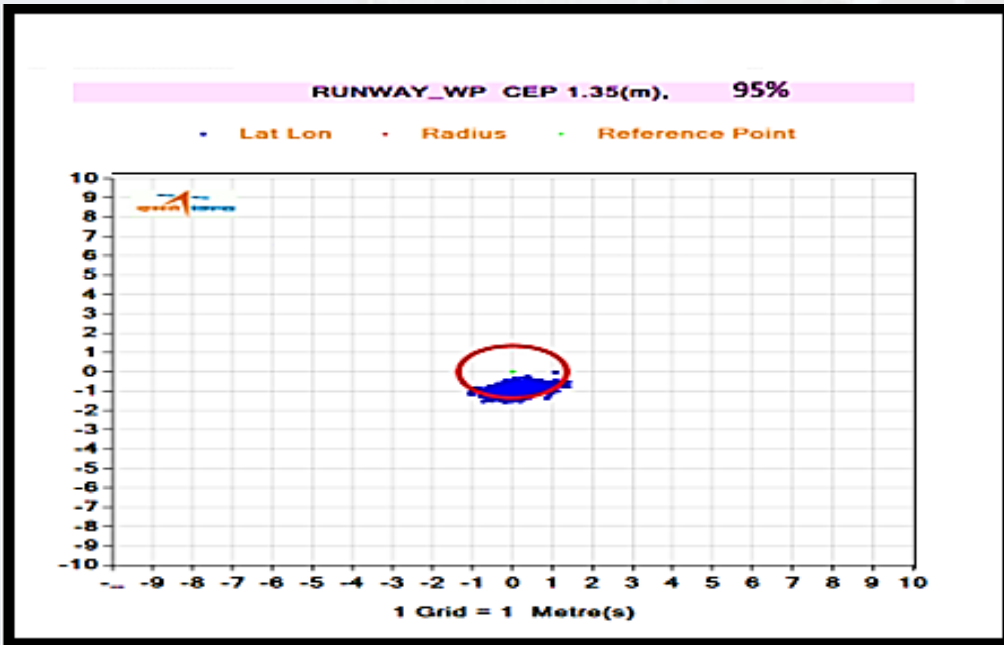
Pseudolite Simulator

RUNWAY_WP CEP 1.35(m), 95%

• Lat Lon   • Radius   • Reference Point

1 Grid = 1 Metre(s)

Testing using Quadcopter

☐ Further characterization in progress
☐ Testings at Indian Airports
☐ Integration of GNSS and Pseudolite based systems

Thank You