A GPS-free Wireless Mesh Network Localization Approach

**Abstract:**

Localization with the use of Ring Overlapping and Subtle Partial Range Aware Approach

**Introduction:**

Distinguish 2 kinds of Mesh Networks:

1. Client-based mesh networks – end-devices participate in packet forwarding
2. Infrastructure-based wireless mesh networks – end-devices do not participate in packet relay and the multi-radio relay nodes(called Mesh Router or Backbone node) compose the network infrastructure

\*primarily focuses on 1

**Related Work:**

Why GPS-free?

Nodes are small and portable, so GPS based equipment on these clients seems too costly

Most localization methods related are GPS-free

Distance measurement methods:

1. Signal transmission time

Example: Time of Arrival (TOA)[2], uses Supersonic signals [3],[4]

Disadvantages:

* Needs time synchronization between receiver and sender
* The speed of radio frequency is too difficult to measure accurately

1. Signal transmission route

Used in systems that does not require high accuracy

Example: DV-hop algorithm based on APS system [5]

Useful in measuring distances between neighbors

1. Signal transmission power (RSSI)

Example: PRA Method [6]

WLAN localization methods:

1. Experiment algorithms

Example: RADAR [12]

Disadvantages: Need large amount of offline works in advance

1. Statistic algorithms

Requires data or history results as a training set for the machine to “learn” with statistic models

1. Signal transmission based algorithms
2. Hybrid algorithms

MANET localization methods:

Self-Positioning Algorithm (SPA) [7]:

* Earliest GPS-free ad hoc positioning algorithm
* High accuracy, and coverage
* Large amounts of calculation

Local Positioning System (LPS) [8]:

* Synthesis of SPA and Trajectory Based Forwarding (TBF)

Cluster Based Algorithm [9]:

* Focuses on solving overhead problems in SPA by dividing nodes into masters and slaves

Backbone-based GPS-free Localization (BGFL) [10], [11]:

* Points out potential problems in the CBA, because master nodes are not robust enough to use quadrilateral consisting of two common nodes and two origins