Location Tracking using Standard 802.11 Networks

International Symposium on Advanced Radio Technologies
March 3rd 2005
Boulder, CO
Company Overview

- Ekahau is the leading provider of software-based positioning technology for WiFi networks.
- The company was founded in 2000 and spun out of the CoSCo group at the University of Helsinki, Finland.
- Funded by Nexit Ventures and Tekes (National Technology Agency in Finland).
- Offices in Helsinki Finland, Saratoga CA and Herndon VA and Hong Kong China.
- Partnerships in place and forming worldwide with leading technology companies and integrators across a wide variety of industries.
Use Cases for Tracking

**Healthcare:**
Real-time patient, caregiver and asset tracking
- time savings
- improved workflow
- increased patient satisfaction

**Supply Chain:**
Forklift, personnel and inventory tracking
- faster, more accurate picking
- improved work flow
- asset visibility

**Process Industry:**
Field engineer/consultant tracking
- improved safety in emergency
- better resource utilization
- location-based alarms, work orders

**Manufacturing:**
Work in progress vehicle body tracking
- faster throughput
- improved asset visibility
- improved workflow
Tracking - Why?

- Where is it Now?
- Where is the closest piece of equipment I need?
- Where can I find a piece of equipment?
- Where was its last location? History? Utilization?
- When is the last time a piece of equipment was calibrated, and where can I find it?
- How many of each type of equipment are out there and where are they?
- What’s on the 3rd floor?
- Do we have everything we need in OR#6?
- The rental company wants their pumps back...
Indoor Tracking Technologies

– Cell-ID
  • Cell size accuracy

– TDOA
  • Requires additional hardware
  • Sensitive to multipath effect

– RFID
  • Requires additional hardware
  • Position known only temporarily (at the gate)

– Ekahau RSSI Technology
  • Utilizes standard 802.11 infrastructure
1. Tracked Devices Measure Received Signal Strength Indicators (RSSI)
2. Send them to Ekahau Positioning Engine (EPE)
3. EPE Matches the RSSI pattern to values stored in the positioning model
4. EPE uses probabilistic algorithm for calculating location estimates
5. EPE sends location estimates to applications
Ekahau Enhancements

• Basic pattern matching is not enough for 3ft accuracy
• Ekahau has created following patented technologies that improve the accuracy significantly:
  1. Ekahau Site Calibration™
     • Process of collecting site specific Positioning Model
  2. Ekahau RailTracking™
     • marks possible routes
  3. Normalization of RSSI values from different network cards and devices
     • Improves accuracy by adjusting the variation between different device’s RSSI measurements
Deployment

1. Install
   - Ekahau Positioning Engine SW
   - Ekahau Client SW

2. Download
   - Floor Plan map
     - png, jpg, pdf, acad, etc

3. Draw Tracking Rails
   - on computer screen, draw lines on floor plan representing the typical pathways of mobile people/devices

4. Perform Site Calibration
   - walk around the site once for RF pre-survey

© 2000 - 2004 Ekahau, Inc. All rights reserved.
Start Tracking

5

Start Tracking!

TRACK PDAs!

TRACK Laptops!

TRACK VoWLAN Phones!

TRACK Barcode/RFID scanners!

TRACK hospital wireless equipment!

Ekahau T201 WiFi TAG!

© 2000 - 2004 Ekahau, Inc. All rights reserved.
Rail-tracking

• RailTracking is a positioning algorithm used in the Ekahau Positioning Engine (EPE)
  – possible routes marked with rails
  – movement capabilities taken into account
  – using observation history
• The following graphs illustrate how RailTracking probabilities evolve in different cases
• Visualized on a straight rail with 100 sample points:
Moving

Without RailTracking

With RailTracking

© 2000 - 2004 Ekahau, Inc. All rights reserved.
"Teleport"

Without RailTracking

With RailTracking
Thank you!

Arttu Huhtiniemi
Director of Product Management
Ekahau
+358 50 598 9153
Arttu.Huhtiniemi@Ekahau.com