

GPS-Based Tracking System for Trauma Patients

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Need for a GPS-based Tracking System

- Tracking systems for trauma patients can serve a very useful function in monitoring patients enrolled clinical trials of pre-hospital care. (daily use)
- They can be invaluable in monitoring patients during a mass casualty event, especially if there is a concern that patients may be contaminated. (hopefully rare use)
- Such dual functionality assures that the mass casualty response system will work when it is needed.
- See Poster P04 at 3:30p.m. by James Atkins, M.D., Ph.D. and Gary Gilbert, Ph.D. for further details on how this is planned to be used

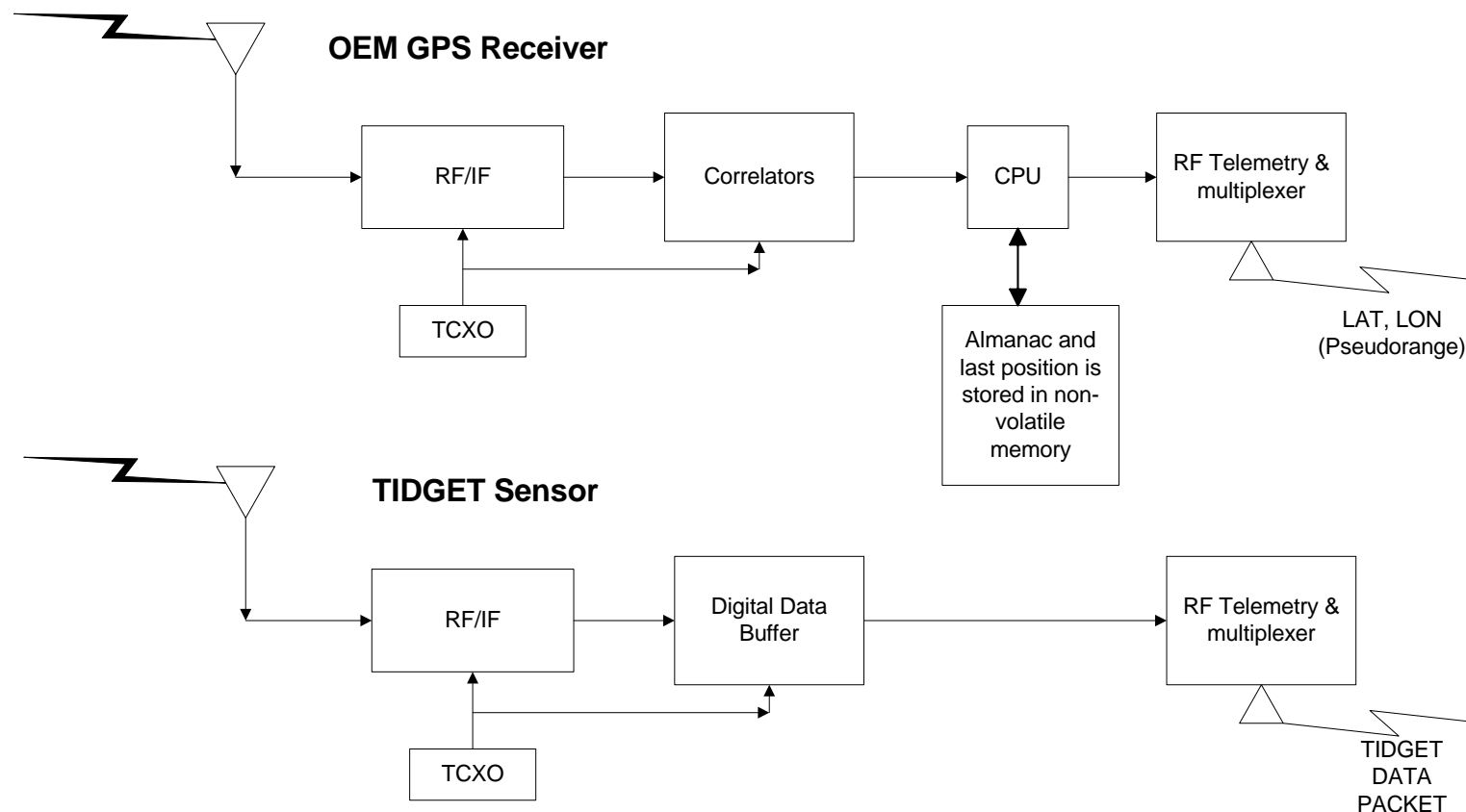
System Capability Requirements

- Time and location recorded every 10 minutes.
- Wristwatch-size Device
- 28 day battery life
- Location accurate to within 30 meters (CEP) and time to within 1 msec
- Wireless data link used to upload data from Device when within 30-100 feet of a Gateway
- Gateway relays Device data to a Portal for data processing
- Portal provides secure protection of the patient's time and location information in accordance with HIPAA.

GeoZigBee Solution

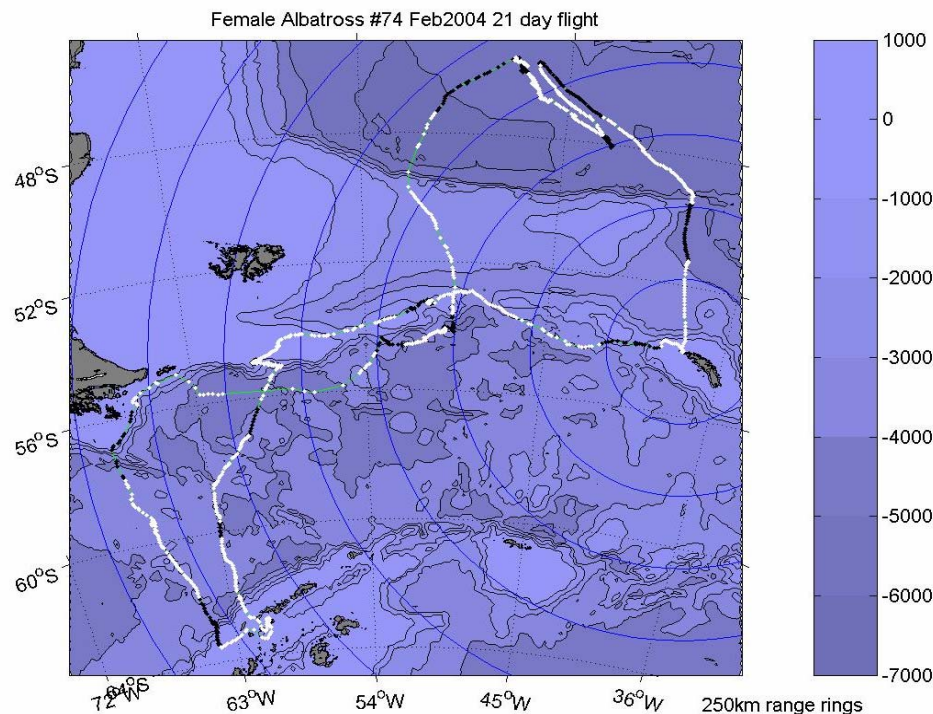
- Wristwatch device includes:
 - GPS Sensor- based on NAVSYS patented TIDGET (Tracking Widget) technology
 - Flash Memory – records GPS and optionally sensor data
 - ZigBee data link – provides wireless network connection
 - Rechargeable batteries and USB interface – provides charger/PC connection for device initialization

GPS Technology Comparison



“TIDGET” Sensor requires a fraction of the power of a GPS receiver

TIDGET Long Duration GPS Tracking Device



15 gram TrackTag device = TIDGET+flash memory+battery
Operates for 1-year (without a data link)

Comparison of COTS Wireless Network Technology

	ZigBee™ 802.15.4	Bluetooth™ 802.15.1	Wi-Fi™ 802.11b	GPRS/GSM 1XRTT/CDMA
Application Focus	Monitoring & Control	Cable Replacement	Web, Video, Email	WAN, Voice/Data
System Resource	4KB-32KB	250KB+	1MB+	16MB+
Battery Life(days)	100-1000+	1-7	.1-5	1-7
Nodes Per Network	255/65K+	7	30	1,000
Bandwidth(kbps)	20-250	720	11,000+	64-128
Range(meters)	1-100+	1-10+	1-100	1,000+
Key Attributes	Reliable, Low Power, Cost Effective	Cost, Convenience	Speed, Flexibility	Reach, Quality

ZigBee = long duration, low power wireless networking solution

GeoZigBee System Architecture

GeoZigBee
Devices



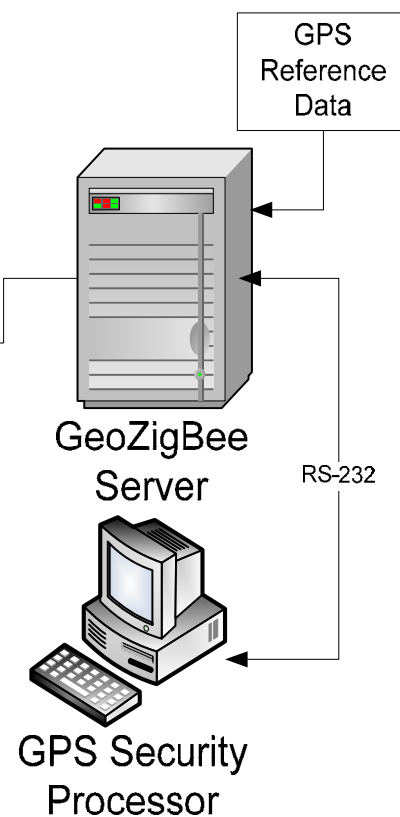
Zig-Bee
Mesh
Net

GeoZigBee
Gateway(s)



InterNet,
WLAN,
GSM,
SATCOM

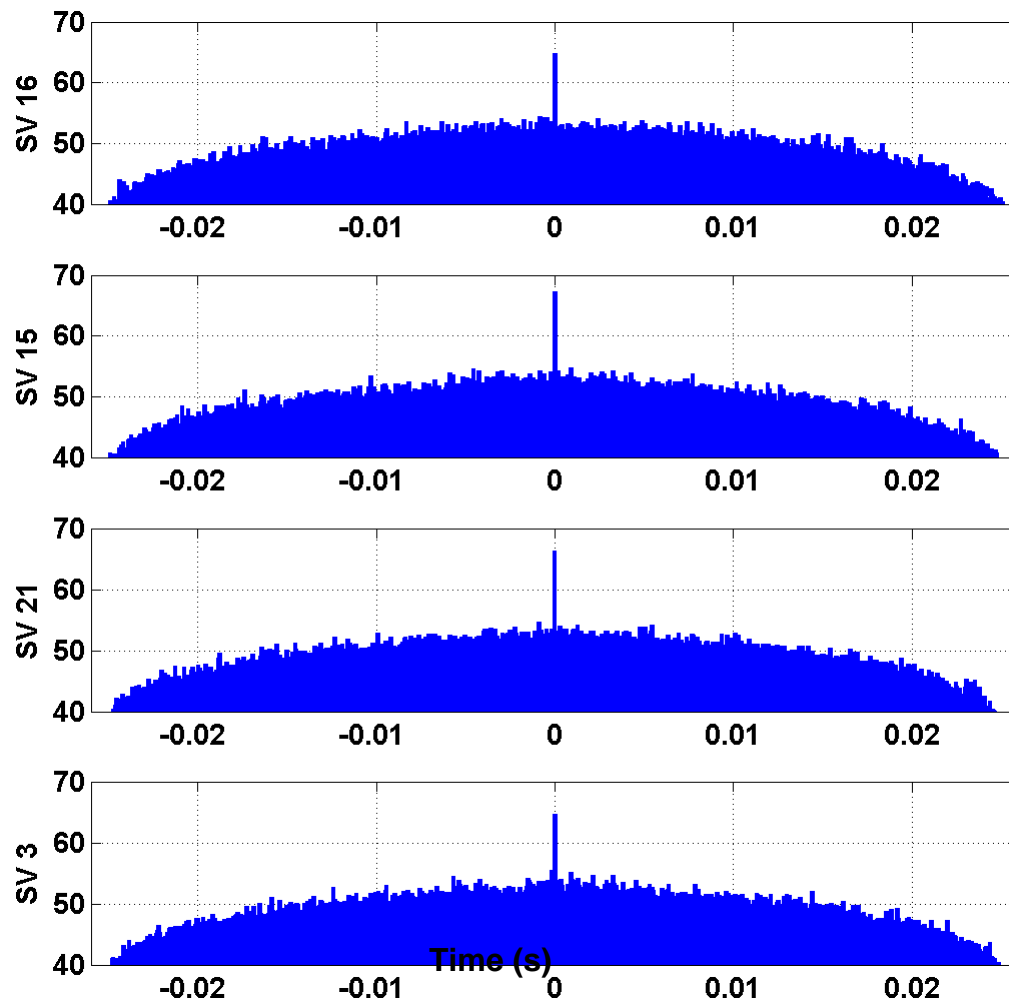
GeoZigBee
Portal



GeoZigBee devices
will operate for 28
days from batteries

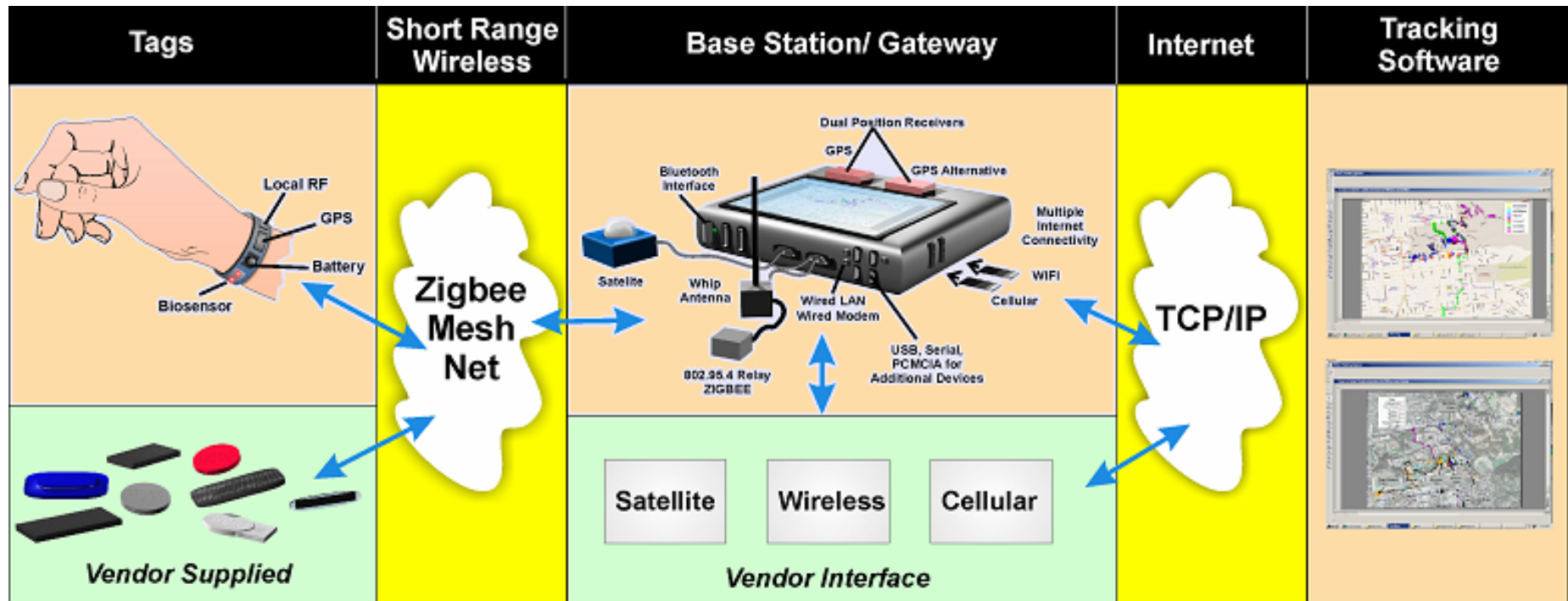
ZigBee Gateways are being developed for
secure uplink of data to GeoZigBee Portal

GeoZigBee Tracking Results



- GPS processing performed by Portal
- GPS Security processor tracks both civil and military signals
- All satellites in view can be processed
- Provides robust position solution allowing GPS operation in challenged environments

NAVSYS' GeoZigBee Tags are being integrated with other sensors and a SATCOM Gateway by Berkeley Labs and Triton Systems



Commercial Standards

Triton Supplied

Vendor Supplied



Robotic Combat Casualty Extraction and Evacuation

Applied Perception Inc.

wireless
comms



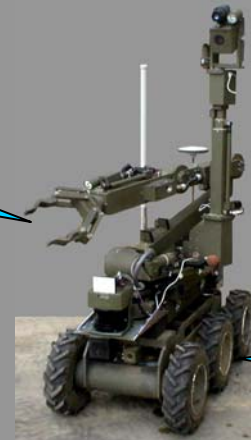
CASUALTY

- Has NAVSYS GPS tracking device



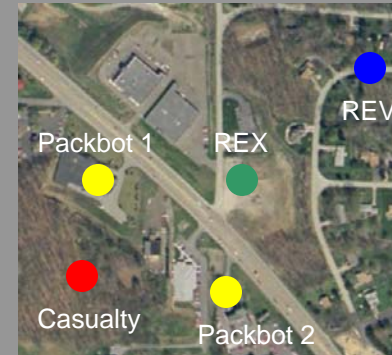
PACKBOT:

- Mobile network node
- First responder for casualty assessment
- Transmits casualty locations to REV and REX



REX:

- Mobile network node
- Deploys stationary network nodes in the field
- Sent from REV to extract casualty



GLOBAL MAP

Map information is transmitted from REV to field hospital



REV:

- Maintains global map of all casualties and robot locations (above)
- Central mission planner – deploys vehicles for various tasks

Conclusion

- Funding for the GeoZigBee development is being provided by TATRC through 3QCY07
- GeoZigBee breadboard is currently under-going testing at NAVSYS
- UCCS is developing ZigBee networking SW
- Delivery of first GeoZigBee wrist-watch units is planned by 4QCY06
- NAVSYS is working with other industry partners to allow use of the GeoZigBee tracking technology for a variety of applications