

Location Services for Healthcare

Class 4: Implementation Issues

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This Week's Agenda

Monday	Overview
Tuesday	Tags and Sensors
Wednesday	Systems and Software
Thursday	Implementation Issues
Friday	Available Products and Future Trends

Course Description

Location service refers to a set of devices and software that allow the tracking of all manner of items in an enterprise. In general these are real time tracking services. Thus, an enterprise has a real time picture of where everything that needs to be tracked is and can deploy, resupply and maintain all these items in a consistent manner. This is a truly Internet of Things (IoT) environment. In the healthcare environment, this level of management can be critical, and can also lead to major efficiencies. In this course we will review the general field of Real Time Location Services (RTLS) and then discuss their application of and use in a healthcare setting.

Today's Agenda

- Choosing a RTLS
- Planning
- Implementation
- Monitoring/Operations
- Security Considerations
- Conclusion

Choosing a RTLS

- This is a complex system to implement
 - Physical challenges
 - Application considerations
 - Understanding of costs/benefits (e.g., return on investment)
 - Integration tasks and needs
 - Operational impact
 - Security

Choosing a RTLS

- Business Requirements
 - Basic Objectives: scope, accuracy
 - Usability: training requirements, automation
 - Deployment: impact on existing infrastructure, complexity
 - Integration: ability to interface with other systems
 - Maintenance: how costly is it to maintain
 - Standards Based: does it conform to standards
 - Security

Choosing a RTLS

- Objectives
 - Scope: what area needs to be covered (whole facility or part)
 - Accuracy: what accuracy is required; may vary by types of loactable
 - Can the available systems cover this, or will more than one be needed
 - Responsiveness: how quickly the system computes location
 - Want a low latency solution

Choosing a RTLS

- Further considerations
 - Environmental: different location technologies work in different ways and are affected by the deployed space
 - Ability to leverage existing infrastructure
 - Scalability: will this have to consist of multiple implementations/zones; capacity of the system
 - Tag life expectancy: will impact costs/operations/logistics

Planning

- Implementation of a RTLS in Healthcare is a complex undertaking
 - In addition to the basic requirements of RTLS there are many safety and regulatory issues to be addressed
 - Considering hospitals, these are often large, complex facilities
 - Typically, many solutions will be deployed, generally from multiple vendors

Planning

- Understanding goals
 - User considerations
 - Who will use (authorization)
 - Why will they use
 - Training and support
 - Security staff applications
 - Tag interaction
 - Form factor
 - User interface (on the tag)

Planning

- Business considerations
 - Budget: working with a budget as determined by the cost/benefit analysis
 - Staffing constraints
 - Organizational Technical considerations
 - Open source
 - Proprietary
 - Evolution
 - Staffing
 - Operational and support

Planning

- Environmental constraints and considerations
 - Operational
 - Temperature/humidity (effect on tags and sensors)
 - Building configuration
 - Is there lots of steel or other materials that might affect operations
 - Cleaning
 - Disinfectant procedures
 - Sensor deployment
 - Typically are hardwired
 - Location (affects accuracy)

Implementation

- Once the planning is complete, implementation can begin
 - Impact on operations
 - New construction has the least impact
 - Wiring in existing facilities can be a considerable cost
 - Implementation can typically be done in phases
 - Choose a specific pilot project (generally a good idea when implementing new technologies)
 - Track the pilot to identify and site specific issues and incorporate in large scale roll-out

Implementation

- Technology selection
 - Talk to multiple vendors
 - Have they implemented in a healthcare environment before
 - Do they have a clear plan for technology evolution
 - What are the capabilities for integrating with multiple systems within the enterprise (e.g., scheduling, billing and other enterprise systems)
 - Work with multiple technologies to gain expertise and experience

Implementation

- Different types of solutions for different applications (generally multiple vendors)
 - Mobile assets: active Wi-Fi + IR
 - Immobile assets: passive UHF
 - Cath lab supplies: passive HF
 - Instruments: 2D barcodes
 - OR Staff/patients: Active 900MHz + ultrasound
 - Hand Hygiene Staff: Active 433 MHz + LF
 - Long Term Care: Ultra Wide Band

Implementation

- Deciding who will do the installation
 - Select an integrator
 - Healthcare RTLS involves physical installation tasks and IT management
 - Engineering tasks
 - Physical plant
 - IT (installation and operations)
 - Interface development (to enterprise systems)
 - Working with vendors
 - On-going support capabilities

Monitoring/Operations

- Monitoring of the implemented system has several dimensions
 - Quality
 - Location accuracy
 - Availability
 - Typically requires 24/7
 - Detecting failures
 - Tags
 - Sensors
 - Business metrics

Monitoring/Operations

- Computing infrastructure
 - Server utilization
 - Middleware and Application software operations
 - Need to monitor and control
 - Failover strategies
 - Update strategy and impacts
 - Capacity planning
 - Network operation and planning

Security Considerations

- Security is a Major concern for any RTLS system, but is especially important in a healthcare setting
 - Confidentiality: a large concern with regulatory implications
 - Availability: tags are not being read or read with less than optimal resolution
 - Integrity: tag information is incorrect or can't be trusted

Security Considerations

- Due to the wireless nature of the technology there are many opportunities for security breaches
 - Data can be read by unauthorized personnel
 - Denial of service
 - Jamming causes location information to be unavailable requiring human intervention
 - Network attacks (wired or Wi-Fi network)
 - Interference with tags (e.g., removal)
 - Asset becomes unlocatable

Conclusion

- Today we have discussed the practical aspects of choosing and implementing a RTLS system in the healthcare environment
- We have indicated the major issues to be considered in monitoring operations
- We have talked about security considerations and issues
- Tomorrow we will look at vendors and future trends