

Wireless Networks & Point of Care Technology: *Implications for Interdisciplinary Collaboration*

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Objectives

- Identify key considerations in an evolving wireless paradigm.
- Discuss development of a structured multidisciplinary wireless local area network management program.
- Describe examples of effective interdisciplinary relationships and practice are led by Nurse Informaticists.
- Assess and evaluate wireless program management and lessons learned.

Acknowledgements



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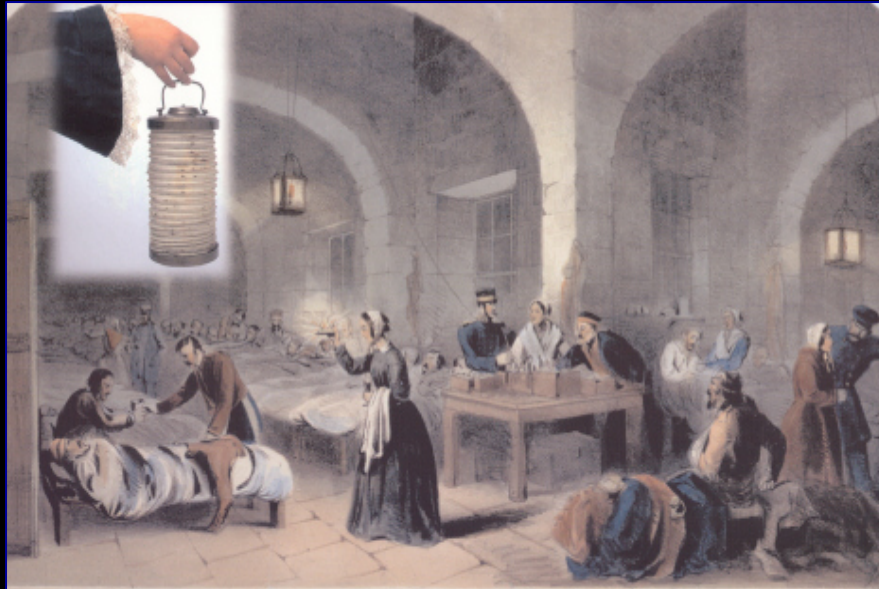


Background

Evolution of Technology in Nursing

- Nightingale and Crimean War
- Modern Nursing
- Information Age
- Patient Safety
- Point of Care Technology





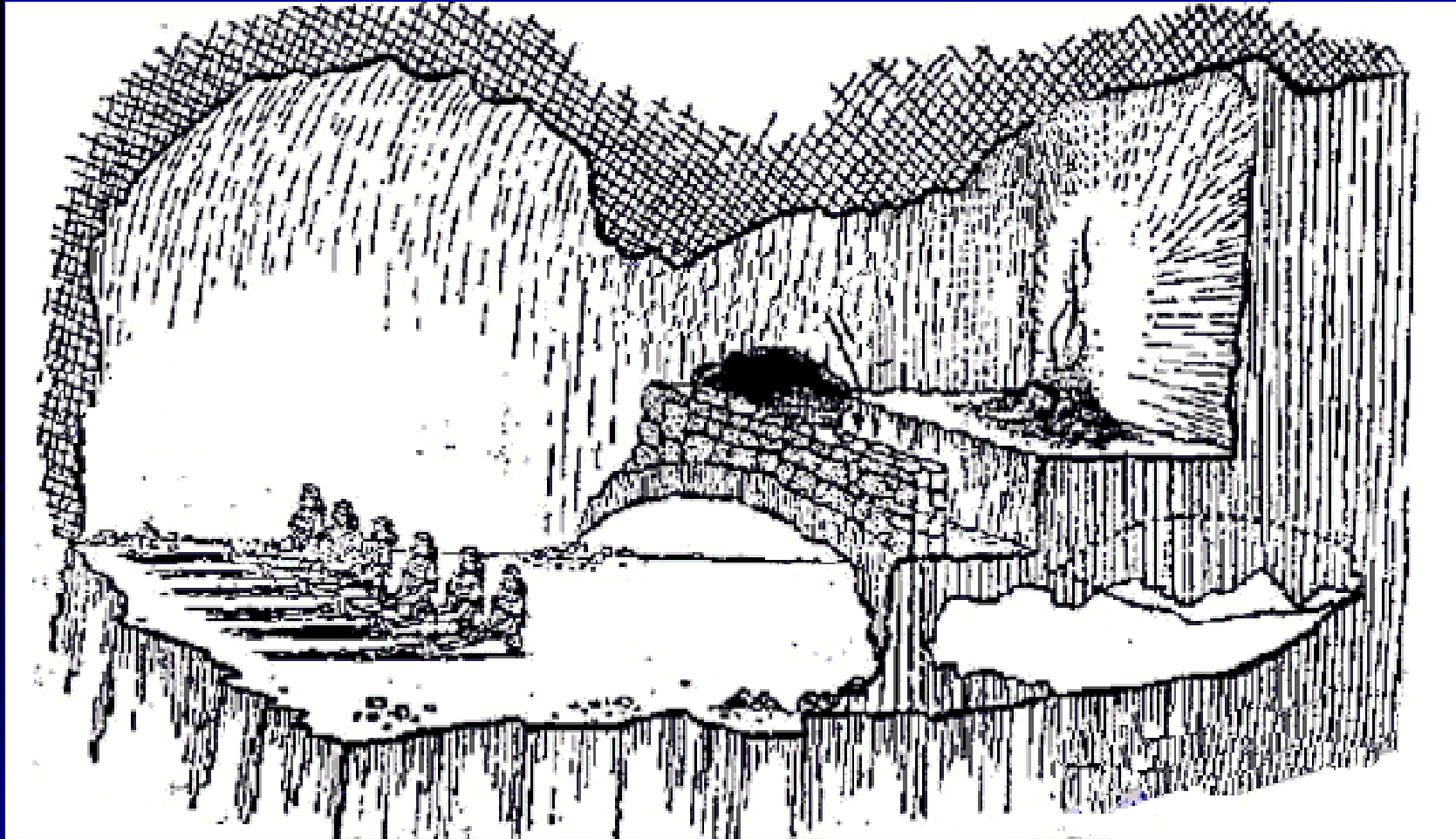
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Nursing Emerges



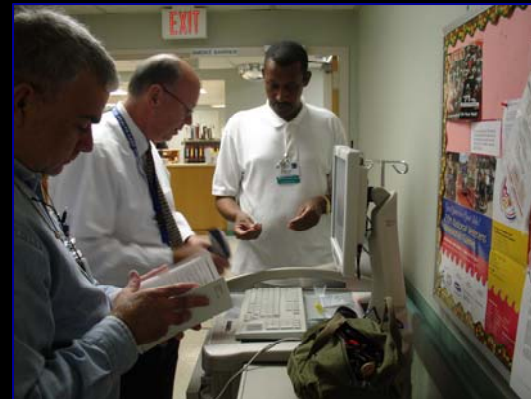
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Historical Background

- 1960's – 1970's Digital spread spectrum radios
 - High available bandwidth
 - Government use for covert communications
- 1980's – 1990's Expansion
 - Narrow band - ultra high frequency
 - First wireless bar coding
 - Cellular digital packet data
- 1993 Wireless technology healthcare implementation
- Present Wireless Local Area Networks

Nurses as *Partners* at Point of Care

Nurses should not abdicate technical troubleshooting responsibility for point of care technology solutions because they are too busy, it's "too technical", or because "it's not my job, call IT"



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Wireless Applications

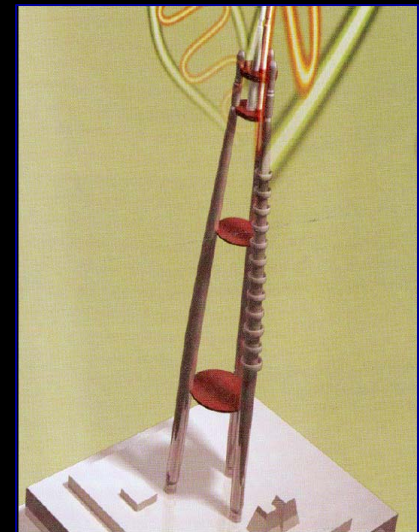
- Point of care service
- Patient Safety
- Error reduction
- Flexibility
- Mobility



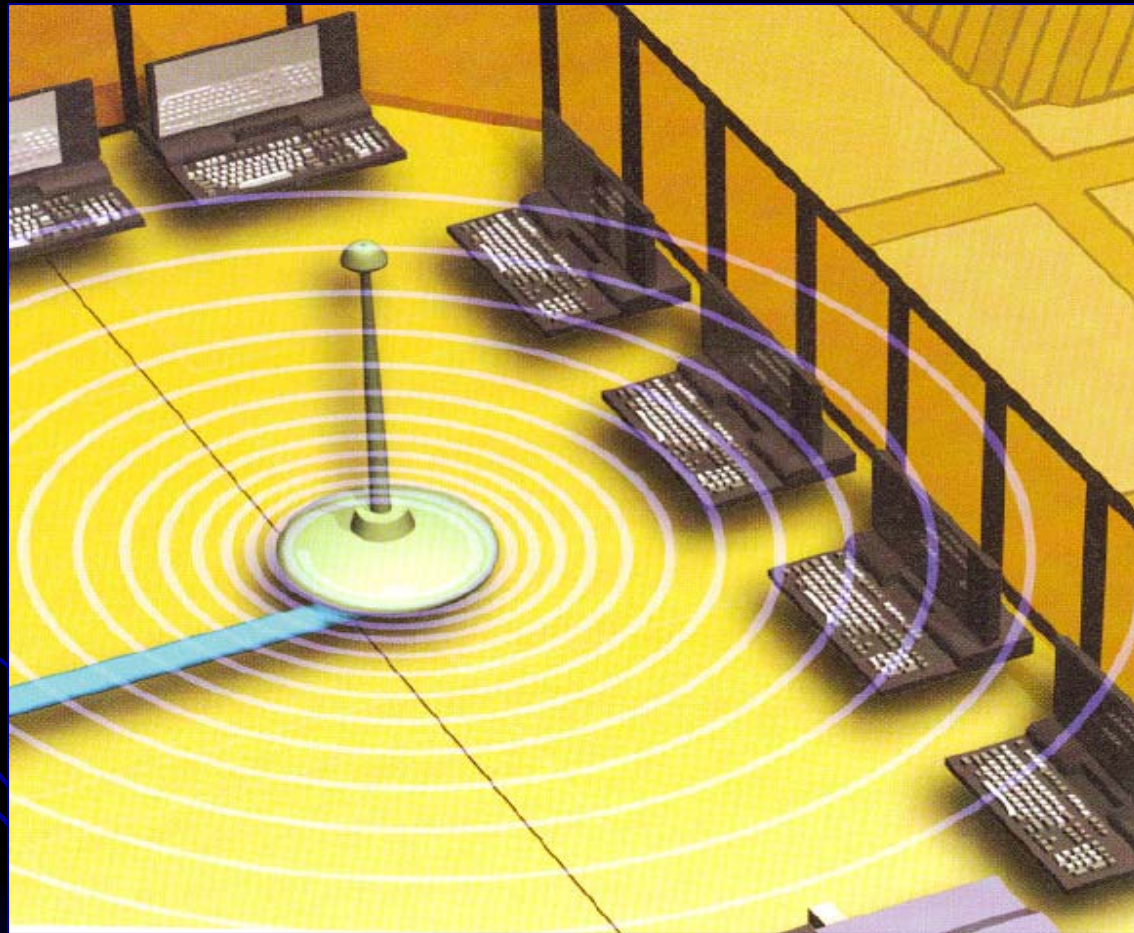
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Wireless technology overview

- Dynamic environment
 - Changes with user movement
- Static environment
 - “fixed” wireless installation
- Mobile client end-user devices
- Wireless infrastructure devices

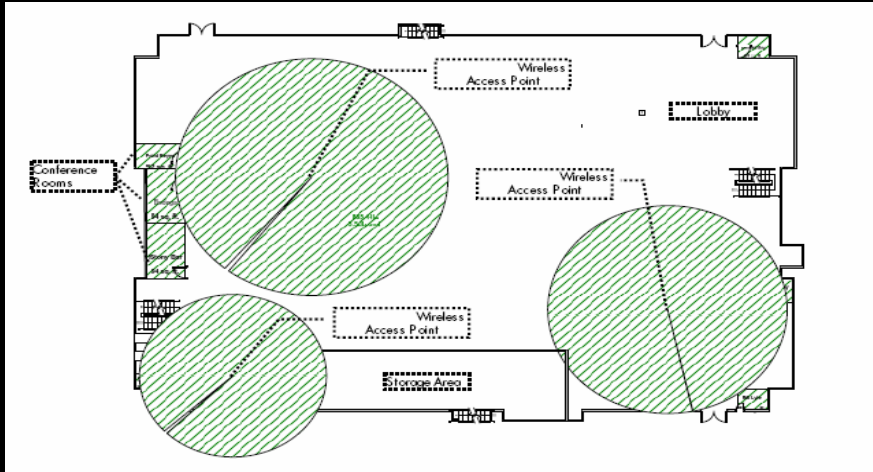


Wireless 101: How Wireless Works



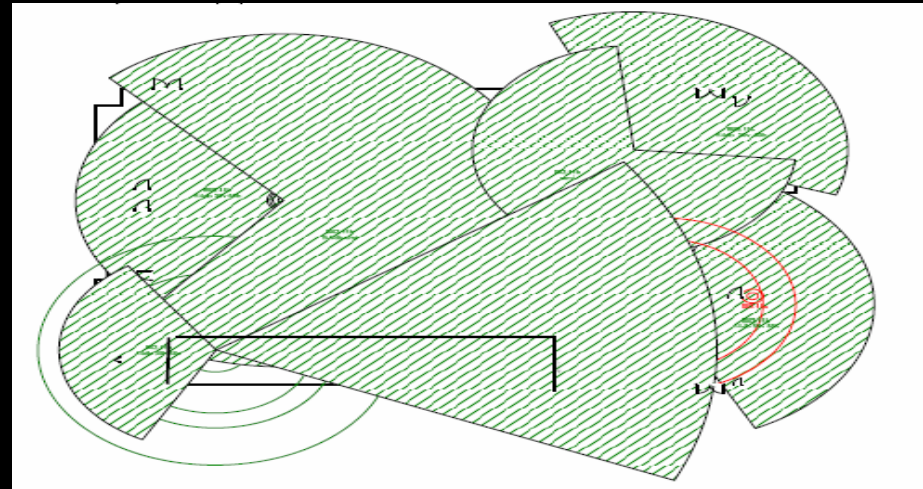
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Wireless 101: Signal Coverage



Partial
Coverage

Complete
Coverage



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(Carlson, 2006)

Strategies

- Assess physical plant, equipment, wireless system reliability, security, stakeholder and end-user education.
- Collaborate with stakeholders
 - Information Technology
 - Biomedical Engineering
 - Information Security Officer, Privacy Officer
 - Administration
 - Nurse Clinicians
 - Pharmacy
 - Patient Safety



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Strategies

- Evaluate current clinical nursing practice
- Illustrate “lessons learned” using examples
- Develop “best practices”
- Focus on multidisciplinary team, nursing leadership & end-user education



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Wireless Issues in Mobile Computing

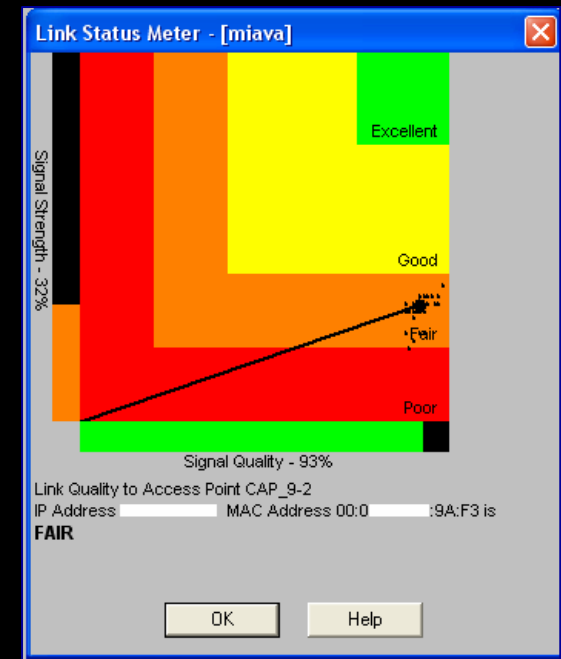
- Mobile medication workstation selection, PDA implementation, mobile computing
- Discriminating scanner, barcode, hardware, software issues, and/or network issues
- Troubleshooting wireless infrastructure
- End-user knowledge
- Rapid Response
 - “*Just in time*” Nursing and IT Nursing staff reporting responsibility

Clinical Examples

- Point of care BCMA interruption
 - Nurse in patient room – patient arm band does not scan
 - Nurse in room, medication cart loses signal cannot bar code scan and administer medication
 - Amidst medication administration loses signal strength or network connectivity

Network Associated Risks

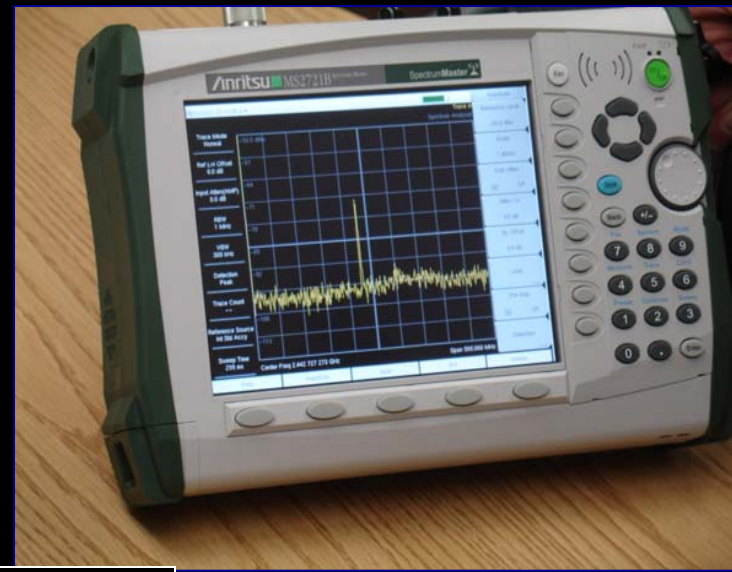
- Rogue access points
- Hardware
- Bandwidth
- Access points
- Security vulnerabilities
 - Range and intended coverage
 - Intrusion detection
 - Denial of service



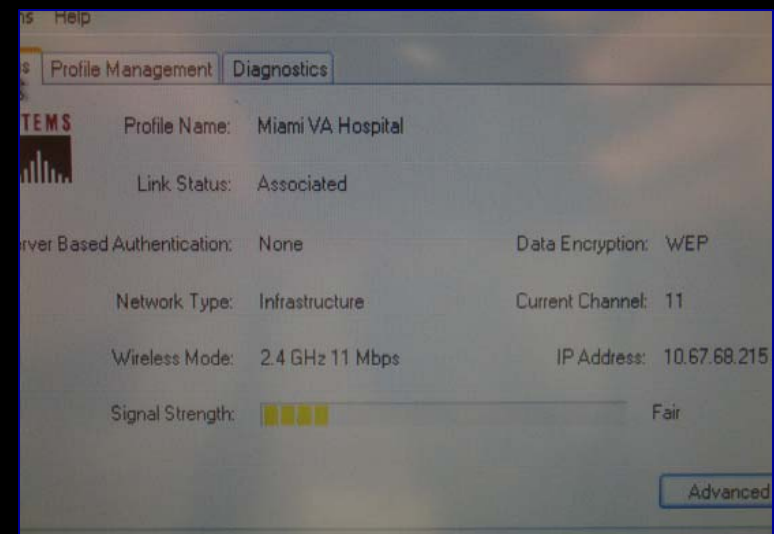
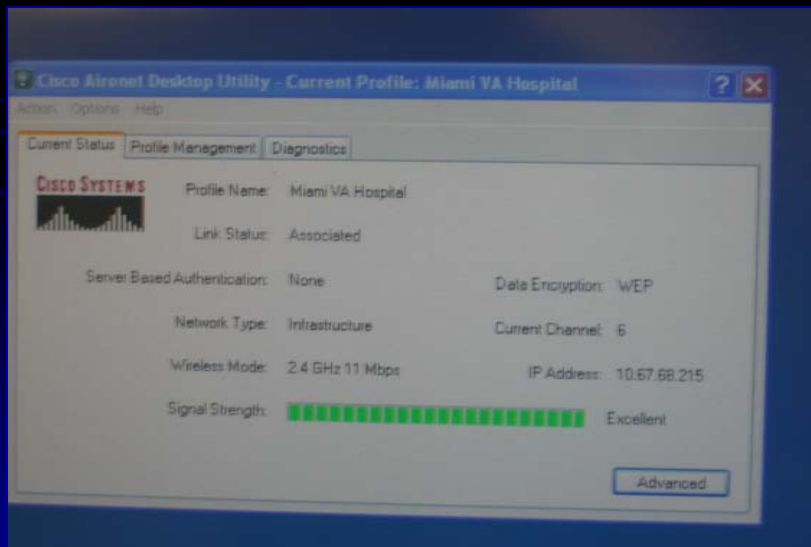
Equipment Needed

- Spectrum Analyzer
- Assess wireless signal strength
- Evaluate roaming history
- Audit “traffic” (loading) on access points





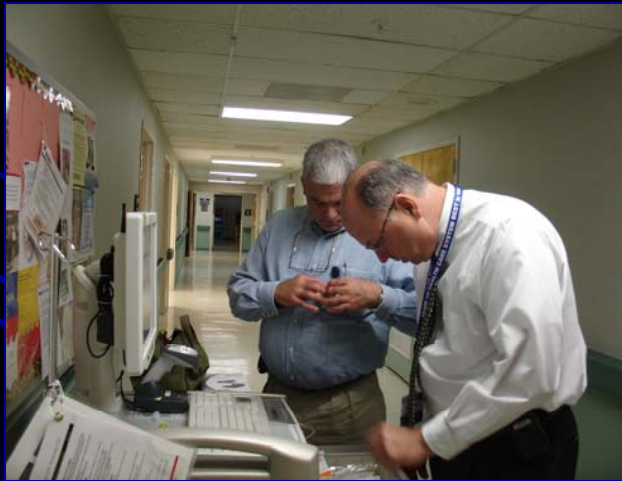
Spectrum Analysis



Mobile Medication Workstation Signal Strength Analysis

Equipment Needed

- Spectrum Analyzer
 - Assess wireless signal strength
- Evaluate roaming history
- Audit “traffic” load on access points



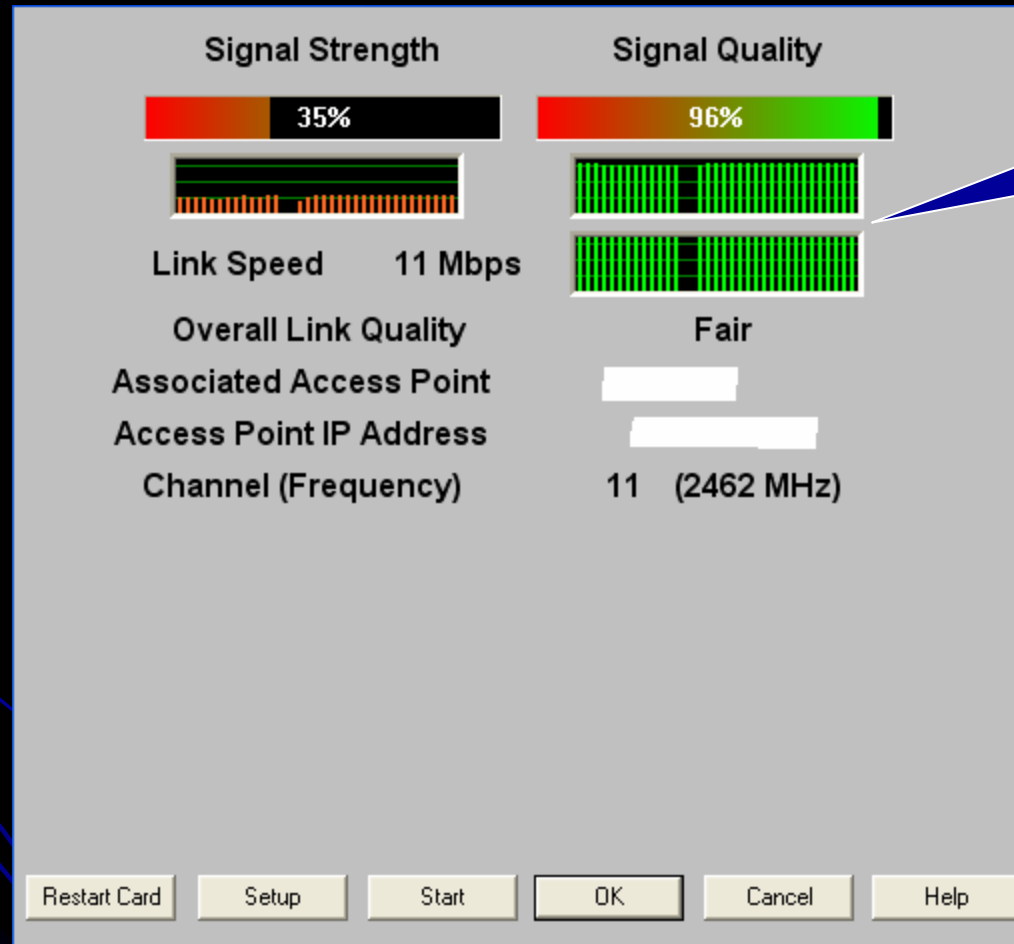
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Lessons Learned

- Signal strength
- Signal quality
- Wireless “drop off”
- Loss of data packets
- Wireless phone interference



Signal Strength & Quality Link Status Meter

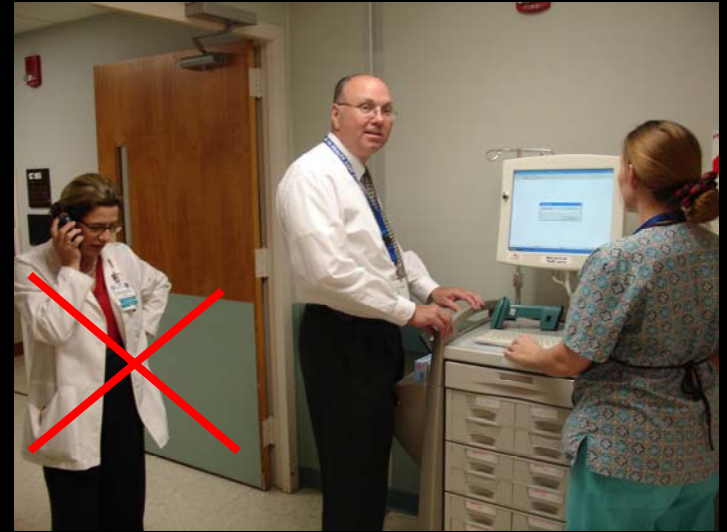


Signal strength
indicator

Potential Threats to Point of Care

Wireless “drop off”

- Signal
- Software
- Hardware
- Loss of data packets
- Interference



Best Practices for Site Survey

- Type and location of antenna
- Noise
- Assessment tools
- Security considerations

(Carlson, 2006)

Best Practices- Summary

- Develop open interdepartmental communication mechanism
- Early planning and physical plant assessment
- Schedule and conduct quarterly routine overall network assessment
- Schedule and conduct frequent random unit-based network “sweeps” or “site—survey”

Conclusions

- Collaborative interdisciplinary strategies are needed for timely and safe health care.
- Nurse leaders must focus awareness of potential impact of networks and wireless technology on nursing care workflow and technology dependent operational systems.
- Nurse Informaticists must be knowledgeable on wireless technologies.
- Seamless care delivery occurs in environments where stakeholders address and respond to clinical issues that impact patient care using this emerging technology.

Nurses Rise to the Challenge



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Next Generation Application



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Implications

- Nurses should not abdicate troubleshooting responsibility for point of care technology solutions because they are too busy, or because it's "too technical"
- Wireless technology is to nursing at the point of care in electronic environments as the stethoscope is to patient physical assessment

Future

- Nursing research
 - Patient safety
 - Human factors
 - Nursing Science
- New wireless applications
 - Remote POC applications
 - wBANs
 - Voice
 - Video





Questions



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