WPAN Applications
Steve Shellhammer
Symbol Technologies, Inc.
shell@symbol.com

List of Possible Applications

• Current Applications
  – Cordless Scanners
  – Cordless Printing

• Future Applications
  – Interconnection of multiple wearable or handheld devices
  – File transfer between several PDAs or portable terminals
Cordless Scanners

• A cordless connection is used as a “cable eliminator” to allow the user to wander around his work area.
• Point-to-point operation.
• One-way communication with an acknowledgment.
• Range up to 100 feet required.

Cordless Scanners

• Limited data rate required - 19.2 Kbps
• 10 to 15 characters every second at most.
• Scanners can be associated by scanning a bar code on the receiver.
• Scanners do not associate with a base automatically.
• Latency of 200 ms is okay. We give audible feedback before transmitting.
Cordless Scanners

- The scanner has to coexist peacefully in many possible RF environments.
  - 900 MHz Wireless LANs
  - 2.4 GHz Wireless LANs
  - Several other cordless scanners in the area.
  - Cordless phones, etc.
- Low power: 30 ma at 3 volts.
- Small size: 0.25 inch$^2$ to 1 inch$^2$

Cordless Printing

- In either a hand-held or wearable terminal we need to form a cordless connection to either a belt worn or fixed mounted printer.
- Point-to-point operation.
- One way communication with an acknowledgment.
- Range of about 20 feet required.
Cordless Printing

- Limited data rate required - 19.2 Kbps
- 100 - 1000 characters every 3 seconds.
- Terminal can be associated by scanning a bar code on the printer.
- Terminals do not associate with a base automatically.
- Latency of 200 ms is okay.

- The terminal & printer have to coexist peacefully in many possible RF environments.
  - 900 MHz Wireless LANs
  - 2.4 GHz Wireless LANs
  - Several other cordless terminals in the area.
  - Cordless phones, etc.
- Low power: 30 ma at 3 volts.
- Small size: 1 inch²
Connecting Multiple Devices

• Connect
  – Hand-held or belt-worn terminal
  – Scanner
  – Printer
  – Wrist I/O unit
• Terminal acts as the master and the other devices are the slaves.
• 10 to 15 feet of range required

• Scanner transmits bar code data to the terminal.
• Terminal sends bar code label information to the printer.
• Terminal sends display information to the wrist I/O unit.
• Keyboard information is sent from wrist I/O unit to terminal.
Connecting Multiple Devices

- Terminal may likely also contain an IEEE 802.11 radio.
- The terminal receives message from host over 802.11 WLAN.
- The two radios inside the terminal need to coexist peacefully.

Connecting Multiple Devices

- One form of association is for the scanner to scan a bar code on the terminal and then scan bar codes on the other peripherals.
- Low power: 30 ma at 3 volts.
- Small size: 0.25 inch$^2$ to 1 inch$^2$
File transfer between PDAs

- Two people with PDAs, portable terminals, or laptop computers, meet in any location and want to be able to exchange files.
- Data rate as low as 19.2 Kbps for PDA type applications to 1 Mbps for laptop type applications (i.e. larger files).
- Association initiated by one of the users and accepted by the other user.

File transfer between PDAs

- Point-to-point communication.
- 10 to 20 feet of range is fine.
- Latency is not an issue. Total file transfer time is concern.
- Any possible interference since you could be anywhere.
- Low power: 30 ma at 3 volts.
- Small size: 0.25 inch\(^2\) to 1 inch\(^2\)
Sharing information in a meeting

• Multiple users (2 ~ 20 people) attend a meeting and one person would like to be able to broadcast a file to all the users in the room.

• A good example of this is the IEEE 802.11 meetings. (In that case the number of users could be much higher).

Sharing information in a meeting

• The master broadcasts to the slaves.

• The master could change since different people may want to transmit a file at different times.

• Association should be initiated automatically when you are in the area.

• The user accepts association with the network.
Sharing information in a meeting

- Data rates as high as 1 Mbps would be useful if the files are large.
- Latency is not an issue. Total file transfer time is concern.
- Any possible interference, since you could be anywhere.
- Low power: 30 ma at 3 volts.
- Small size: 0.25 inch$^2$ to 1 inch$^2$

Broadcast Information for People Entering a Location

- When a user, who is carrying a PDA, enters a location (e.g. store or office room), he receives messages.
- Association is automatic.
- Some information is passed in the association request signal.
- User accepts association either manually, or for some applications, automatically.
Broadcast Information for People Entering a Location

• Master-slave configuration, with fixed transmitter acting as master, and the users with their PDAs, being slaves.
• Information (e.g. advertising) is broadcast.
• Users can act on the information.
• Latency is not a major issue.
• Message sizes are likely under 1 Kbytes.

• 19.2 Kbps is probably fine.
• Interference could include WLAN and cordless phones.
• Low power: 30 ma at 3 volts.
• Small size: 0.25 inch$^2$ to 1 inch$^2$