ZIGBEE WIRELESS VEHICULAR IDENTIFICATION AND AUTHENTICATION SYSTEM

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TOPICS

- Zigbee
- Radio Frequency Identification (RFID)
- System Model
- System Operation
- System Implementation
ZIGBEE

- Communication protocol
- Based on IEEE 802.15.4 standard
- Low power
- 868 MHz (Europe), 915 MHz (USA & Australia), and 2.4 GHz
- Zigbee devices: Zigbee Coordinator, Zigbee Router and Zigbee End Device

http://en.wikipedia.org/wiki/ZigBee
ZIGBEE STACK ARCHITECTURE

Application Framework
- Appln. Object 240
- ...........
- Appln. Object 1

Zigbee Device Object (ZDO)

Application Support Sublayer (APS)
- APS Security Management
- APS Message Broker
- Reflector Management

Network (NWK) Layer
- Security Management
- Message Broker
- Routing Management
- Network Management

Medium Access Control (MAC) Layer

Physical (PHY) Layer
RFID

RF tags

- Can store data
- Data can be written or read
- Active, semi-passive or passive

RF readers can read RF tags
RF writers can write to RF tags
SYSTEM MODEL

- RF tag
- RF reader/writer
- RS 232
- Ethernet
- Laptop/Desktop
- Central Database
SYSTEM OPERATION

- RF reader/writer – Zigbee Coordinator
- RF tag – Zigbee End Device
- Device Profile – Vehicle Identification Device profile
SYSTEM OPERATION
SYSTEM IMPLEMENTATION

- Antenna
- Power control circuitry
- Transceiver 2.4 Ghz
- Microcontroller PIC 18LF4620
SYSTEM IMPLEMENTATION

Antenna

- Inverted F-type PCB antenna
- Wire Monopole
SYSTEM IMPLEMENTATION

Transceiver

- Chpicon AS CC2420
- Frequency: 2.4 to 2.4835 GHz
- Data rate: 250 kbps
- Modulation: Direct Sequence Spread Spectrum

http://focus.ti.com/lit/ug/swru044/swru044.pdf
SYSTEM IMPLEMENTATION

Microcontroller

- Microchip Inc.’s PIC18LF4620
- Zigbee protocol stack provided
- 3 wire SPI, I2C, USART
- 10 bit A2D converter
- Security : Advanced Encryption Standard
SYSTEM IMPLEMENTATION

Power control circuitry

- 3.3V needed
- RF tag - car battery
- RF reader/writer - mains
- MC 7805 converts voltage(12 or 9) to 5V
- MAX 882 converts 5V to 3.3 V
CONCLUSION

- System Model
- System Operation
- System Implementation
REFERENCES

- http://en.wikipedia.org/wiki/ZigBee
- www.microchip.com
- Zigbee Specification, Zigbee Document 2_08006r03ZB_CSG