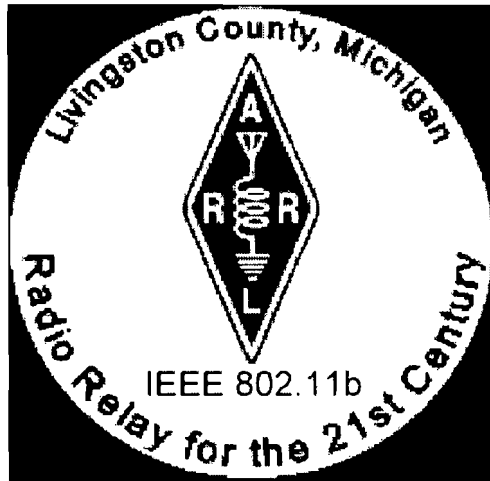# HSMM SEPTEMBER 2003

ARRL Technology Task Force

Created by Neil Sablatzky K8IT and Mark Williams AB8LN

Introduction

American Radio Relay League (ARRL)

- Technology Task Force (TTF)
  - Working Groups
    - Digital Voice
    - Software Defined Radio
    - **HSMM - High Speed Multi-Media**

ARRL Technology Task Force

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Welcome to the Hinternet

- K8OCL – Dr. John J. Champa

    Chairman ARRL HSMM WG

    k8ocl@arrl.net

- K8IT – Neil Sablatzky

    HSMM-HF Project Leader

    k8it@arrl.net

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ARRL HSMM Working Group

- Established January 2001 by the Board

- Operational January 2002

- Focused on using IEEE 802.11b Standard

- Adapting it to Part 97 Operation on 2.4 GHz

- Educate amateurs to promote HSMM QSO's

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What is the Hinternet?

- An Amateur Radio version of the Internet

- Meets FCC part 97 rules

- Designed to provide multi-mode QSOs

- Real-time communications

- Emergency Communications

- Simultaneous Voice, Data, & Video QSOs

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What is the Hinternet?

- Point to Point Contacts

- Multi-Point Contacts

- Live full motion (full duplex) color video

- Full duplex FM-quality voice

- Remote control of your station

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What is the Hinternet?

- High speed internet access possible
  - 11MB/Second Data Rate
  - Voice over Internet Protocol (VoIP)
  - eQSO, Ilink, EcoLink, IRLP, WIRES, Others
  - Callsign Lookup, DX Cluster, APRS

- Future
  - Higher Data Rates
  - High Speed Multi Media On HF Frequencies

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What is the Hinternet?

RADIO

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Where is the Hinternet

- HSMM has a national database which we share with the national APRS station database.

http://db.aprsworld.net/datamart/wifi-search.php

- All HSMM stations are shown as a diamond symbol with an "8" inside

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Where is the Hinternet

K8IT <8>

K8OCL <8>

1.8 MILES

HSMM Test Path

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HSMM-hardware

- What do I need to connect?
  - Computer or PDA
  - RIC card or Access Point
  - Optional Amplifier
  - Antenna
  - Camera
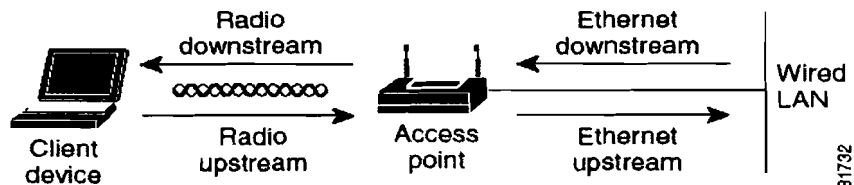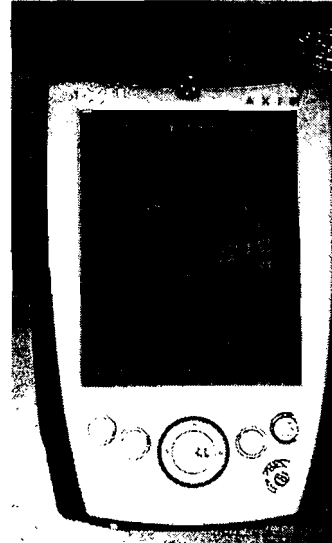 - Microphone, Speakers or Headphones

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HSMM-hardware

- Computer
  - Notebook, desktop, tower, handheld
    - Mac, PC, or PDA
    - Any Operating Systems
  - Microphone
  - Video-interface
    - Webcam
    - Snappy
    - Digital camera in live mode
    - VCR/DVD
      - Stay Legal (Remember Part 97 Rules)

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HSMM-hardware

HSMM HANDHELD

Dell Axim PocketPC

w/ IEEE 802.11b Compact Flash Card

Open Source H 323 VideoPhone Application

|	Radio downstream		Ethernet downstream	
Client device	Radio upstream	Access point	Ethernet upstream	Wired LAN

81732

- RIC CARD (Radio Interface Card)
  - Ensure it works with your computer hardware
    - USB
    - PCMCIA (notebook computers)
    - PCI
    - Built in (usually PCI)
  - Ensure it works with your Operating System
  - RIC Mode
    - Ad hoc or Infrastructure (AP) mode
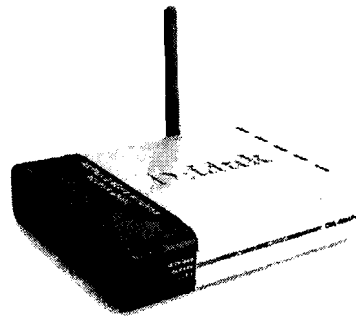- AP Access Point
  - Modes of operation

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HSMM-hardware

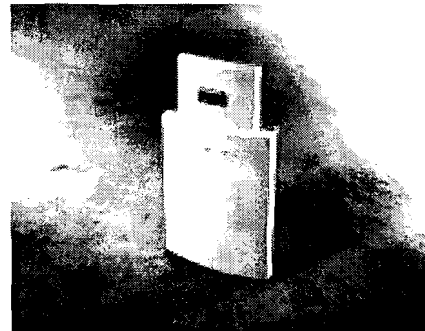Cisco 350 Series PCMCIA RIC (Radio Interface Card) 100 mW
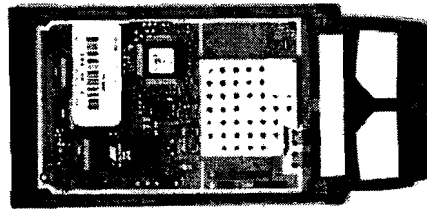
Intel 2011 PCMCIA RIC

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HSMM-hardware

Dlink DWL-900AP+ Access Point   Cisco 1100 Access Point

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HSMM-hardware
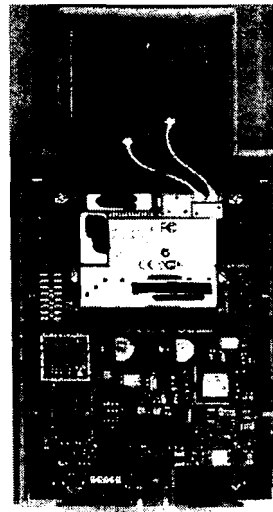
Cisco model 1100 Access Point
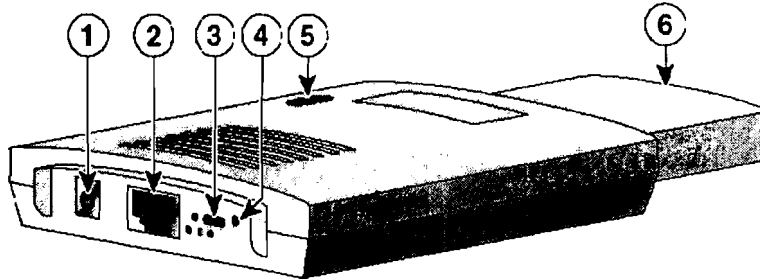
1	48 VDC power port	4	Mode button
2	Ethernet port (RJ-45)	5	Status LEDs
3	Cable lock slot	6	Antenna

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HSMM-hardware

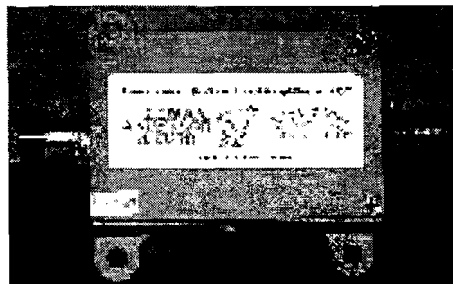Cisco model 1100 Access Point

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HSMM-hardware

- Amplifiers
  - Transmit RF AMP
  - Bidirectional AMP
  - Separate
    - While using diversity antenna provisions
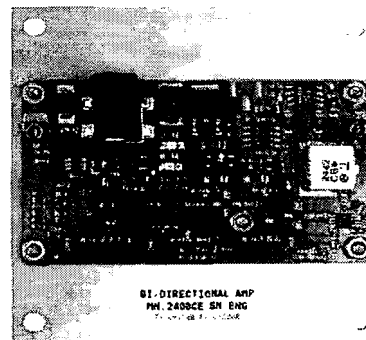
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HSMM-hardware

OPTIONAL AMPLIFIER - BDA

Fab-Corp 1 Watt RF AMP   RF-LINX 800 mW BDA

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HSMM-hardware

- Antennas
  - Connectors
  - Pigtail connectors
  - Polarization
  - Pattern
    - Omni or directional
  - Height
  - RF Safety

Fab-Corp Horizontal Polarized
Directional 24dbi Parabolic
Reflector

Trevor Marshall's Slot Antenna Design
Horizontal Polarized Omni Directional Antenna

- ARRL Technology Task Force Hsmm

HSMM-hardware

- Diversity Antennas
  - Dual antenna provisions
  - Space diversity
  - Polarity diversity
  - Separate receive vs. transmit antennas

- ARRL Technology Task Force Hsmm

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HSMM-hardware

- How does the radio in this thing work?
  - IEEE 802.11b
  - WiFi hardware
  - DSSS (Direct Sequence Spread Spectrum)
  - Spectrum
    - Channels

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Frequencies

- ch1 2412 Mhz Overlaps with Satellites
- ch2 2417 Mhz
- ch3 2422 Mhz
- ch4 2427 Mhz
- ch5 2432 Mhz
- ch6 2437 Mhz Default Part 15 channel
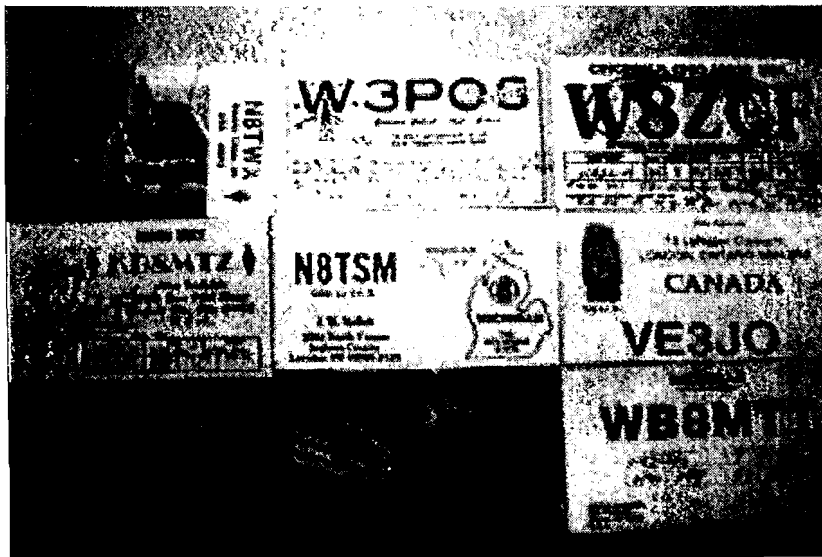- ch7 2442 Mhz Bandwidth too wide!

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Remote Control

- Remote control of rigs, balloons, telemetry, ?

- Full duplex Video, Data, & Voice for total solutions
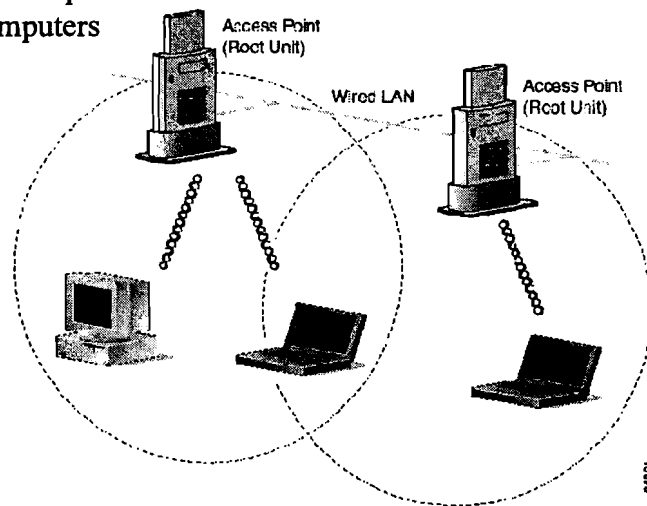

ATV via HSMM

Application Software

- Windows:
  - Net Meeting
  - H323 Open Source
- Linux:
  - H323 Open Source
  - OhPhone
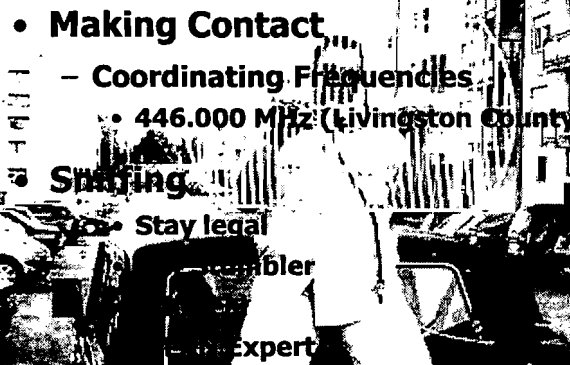 - GnomeMeeting
- MAC O/S

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HSMM Networks

Access points and client computers

Access Point (Root Unit)

Wired LAN

Access Point (Root Unit)

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HSMM Node Configuration

- RIC drivers and utilities
  - Drivers and setup per hardware used
- Configuration
  - SSID (Service Set Identifier) (AP Callsign)
  - Computer Nodename (Your Callsign)
    - Activate Ping routine or ID by video or voice
  - WEP (Wired Equivalency Protocol)
    - Can be used for authentication not encryption
    - Key must be published publicly

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HSMM CQ QSO

- **Making Contact**
  - **Coordinating Frequencies**
    - **446.000 MHz (Livingston County)**
  - **Sniffing**
    - **Stay legal**
    - bler
    - xpert

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HSMM WG VIEWPOINTS ON APC

- Present 1 watt limit restricts networks

- Current APC regulations support point-to-point links not multi-point networks

- Investigating designs of low cost configurable bi-directional amplifiers (BDA)

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HSMM WG – 2003

- Methods to link local HSMM networks

- Amateur HSMM equipment reviews

- Liaison with Part 15 community

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Feasibility Studies – Ongoing

• ARES/RACES Homeland Security Communication Network Training Needs

• WLAN Gaming (Chess, Battlefield 1942, ?)

• Satellite HSMM with AMSAT-NA

• Amateur HDTV

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HSMM-HF PROJECT
Neil Sablatzky K8IT Project Leader, k8it@arrl.net

• Intra-City HSMM-HF Backbone
• ARES/RACES Homeland Security Networking
• Based on AC5OG Gerald Youngblood's SDR-1000 Software Defined Radio Platform
• Investigating other compatible hardware
• Modulation similar to OFDM, Q15X25 technique
• Focus on 10 & 6 meters
• Documenting compliance to FCC rules
• Goal to have demo in 2004
• Windows Visual Basic Programmer's Needed!
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Questions ?

CQ HSMM ..... CQ HSMM .....

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