July 1998 doc.: IEEE 802.11-98/251

Home RF Working Group

Update from Meeting of June 15-16, 1998

July 1998 doc.: IEEE 802.11-98/251

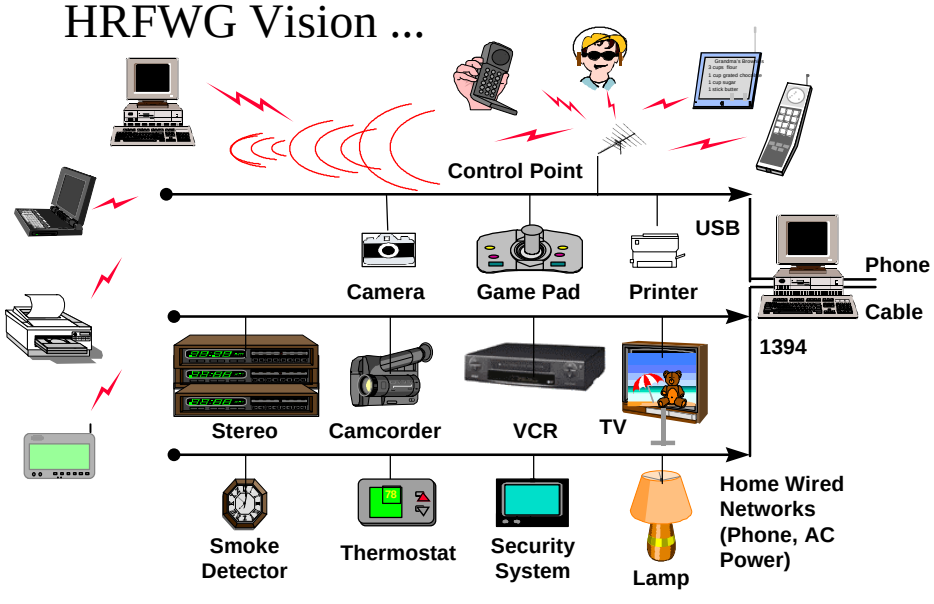
HRFWG Mission Statement

To enable the existence of a broad range of **interoperable consumer devices**, by establishing an **open industry specification** for unlicensed RF digital communications for PCs and consumer devices **anywhere, in and around the home**.

What HRFWG Is Not...

- A platform to give a company a marketing advantage
- An ISO standards body
- A business coalition
- Just a specification development group
-

HRFWG Vision ...



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Marketing Information

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Membership Roster

There are over 40 member companies

3COM
Alps
Advanced Micro Devices
Aironet
Broadcom Corporation
Butterfly Communications
Casio
Cisco Systems
Compaq
Ericsson Enterprise Networks
Fujitsu
Harris Semiconductor
Hewlett-Packard
Hosiden
IBM
Intel
Intellon
Kansai Denki
LG Electronics
Matsushita Electronics
Microsoft
Mitsubishi

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Member Roster (Cont.)

Motorola
NEC
National Semiconductor
NEC Corporation
Nortel
Oki
Primax
Philips Consumer Communications (PCC)
Proxim
RF Monolithics
Rockwell Semiconductor Systems
Samsung Electronics
Sharp (verbal commit)
ShareWave
Siemens
Silicon Wave
Symbionics
Texas Instruments
WebGear

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HRFWG Capability Stack

The HRFWG - A self-contained organization

- Semiconductor/ASIC Component suppliers
- System-level solution providers
- Software, O/S
- PC OEMs
- Cordless Telephone OEMs
- Data Communications
- Consumer Electronics OEMs
- Mobile Computing Device OEMs
- Information Appliance Mfgs.
- Telecommunications
- Peripheral Vendors
- ISVs, application software
- Internet Service Providers
- Network Vendors
- Telcos
- Home Security
- Home Automation
- Toy/Game Vendors

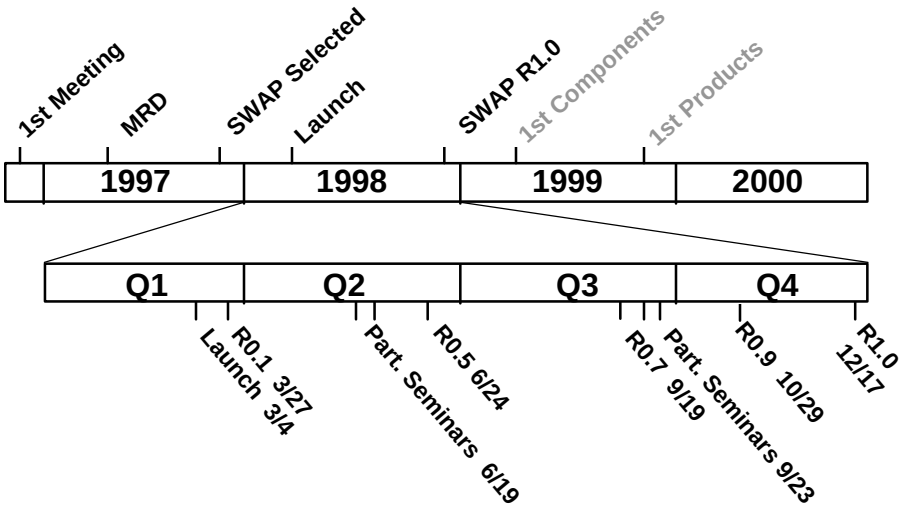
Resource Sharing

- Multi-PC homes can share files/modems/printers
- Replace the “sneakernet” with RF
- PC’s and other new devices can share an ISP connection
  - Only one PSTN line and ISP account required
  - Perfect for evolving big pipes such as UDSL or cable modem
  - Enables portable viewers, gaming devices, infopads, etc.
- Peer to peer communication enables interactive entertainment and information sharing

Benefits of Engagement

- PC, Telecomm, CE, and other industries converging on wireless connectivity
  - Enable a larger market for home wireless connectivity by creating the first digital, open industry standard
- Gain access to technical & marketing information
  - More opportunities to develop new differentiated products
  - Enjoy early time to market
  - Obtain collective marketing data
- Influence the final specification
  - Be involved in the decision making process

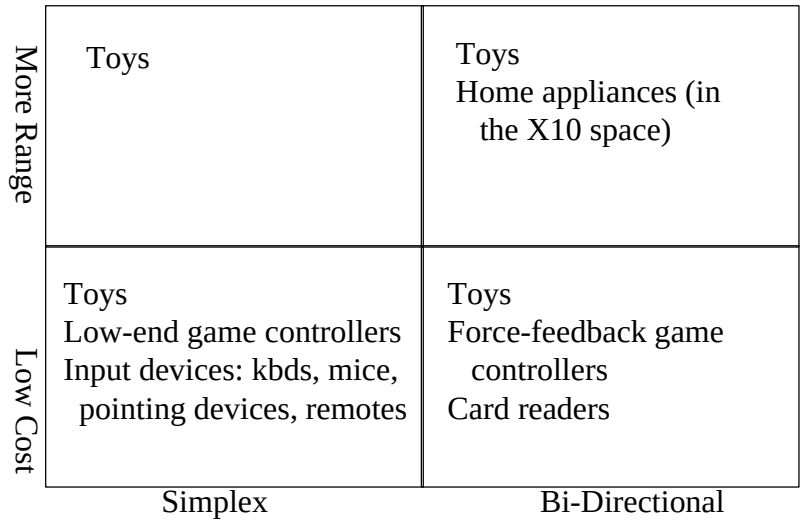
HRFWG Timeline



SWAP-MM & SWAP-Lite Sub-Groups

- SWAP-MM Sub-Group
  - 3Com
  - Butterfly Communications
  - Ericsson
  - Harris Semiconductor
  - Intellon
  - LG Electronics
  - Motorola
  - PCC
  - Samsung
  - ShareWave
  - Symbionics
- SWAP-Lite Sub-Group
  - Butterfly Communications
  - Harris Semiconductor
  - RF Monolithics
  - Rockwell
  - WebGear
  - Primax

SWAP-Lite Application Space



HomeRF vs. Bluetooth

HomeRF	Bluetooth
• Optimized for Home wireless voice & data requirements	• Optimized for cellular phones & mobile device requirements
• 50m in the home & yard	• 10m in shirt pocket/briefcase
• 6 near line quality voice links	• 3 near-line quality voice links
• Unlimited device links/base	• 7 device links/base
• 1.2 Mbps 4FSK (assumes traffic patterns & TCP OH)	• 600 kbps 2FSK (assumes no interference or OH)
• 4 types: voice/Data/Both/Base	• One type: Voice-Data-Base
• 2.4 GHz, 50 Hop/sec radio	• 2.4 GHz, 1600 Hop/sec radio
• Peer-to-Peer networking	• Multipoint-to-point connections
• “Native” TCP/IP support	• Point-to-point TCP/IP support
• Low power paging mode	• Low power standby mode
• Lower transmit power possible	• Higher transmit power possible
• Based on shipping 802.11 & DECT technology	• Based on working prototype radio technology

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Technical Parameters

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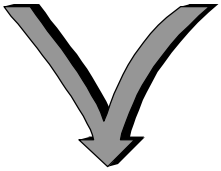
SWAP Origins

802.11
Uses CSMA/CA
Good for Data

DECT
Uses TDMA
Good for Voice



SWAP
TDMA + CSMA/CA
Good for Voice & Data
Optimized for small networks

Where does HomeRF Fit ?

- It handles voice like DECT or PHS, but...
  - Frequency hopping
  - 20 ms frames
  - interleaved up and down links
  - Retransmission (single)
- It handles data like 802.11, but...
  - Relaxed PHY layer specifications to reduce cost
  - Beacons to manage I node traffic
  - Simplified protocol (no PCF)

HomeRF Device Types

Cordless Telephone

TDMA - Isochronous (I node)
> Designed for minimum latency applications such as telephones

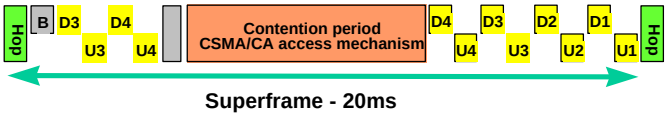
Fridge pad

CSMA - Asynchronous (A node)
> Designed for TCP/IP traffic

PSTN

•CP - Connection point…can manage a network or act as an A node
- Can be USB, PCI, PC-Card, Device Bay, etc.
- CP can place calls even when PC is down (1.0)

SWAP Frame



- Hybrid TDMA/CSMA frame
  - Up to 6 isochronous nodes, with retransmission*
  - Virtually unlimited A nodes
- Beacon from Connection Point (CP) sets frame structure if I nodes present
- Frequency hopping, 50 hops/sec
- 2 or 4 FSK yields 1 or 2 Mb/s
- Also supports TCP/IP voice

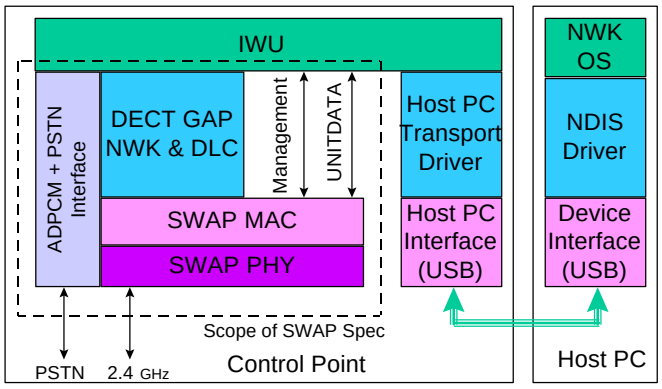
MAC/PHY Features

- MAC provides good support for voice and data by using both TDMA and CSMA/CA access mechanisms
- Support for 6 high quality voice connections
  - ADPCM codec
  - Integration with DECT
- High data throughput - 1 Mb/s or 2 Mb/s

MAC/PHY Features (Cont.)

- Data security - None/Medium/High levels of encryption
- Data compression (LZ)
- Power Management Support
- 24-bit Network ID
- 50 m range at 100 mW Tx power - also short-range, low power option

CP to PC Architecture



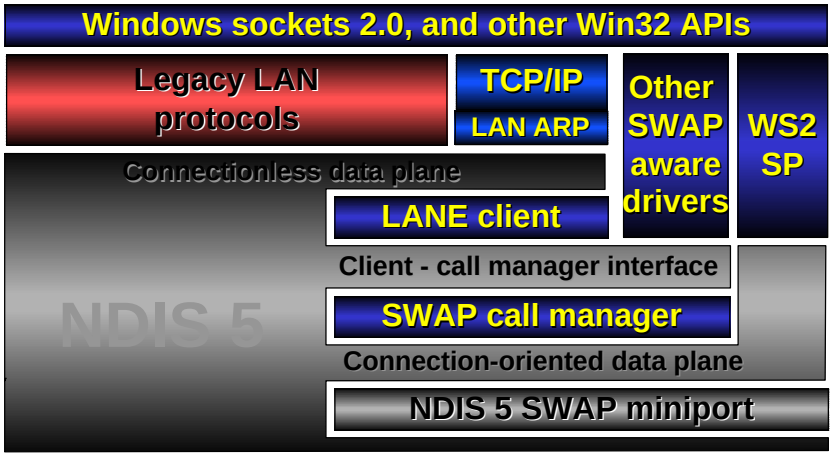
The PC Interface

- SWAP's PC connection is designed for use under Windows 98
  - Wake on ring
  - Connection Oriented NDIS (NDIS 5)
    - Compatible with NT 5
    - ATM friendly
  - A nodes will be exposed as 802.3 networking devices
  - I nodes will be exposed as ATM clients to TAPI Proxy
- Windows 95 interface will be vendor determined - only A node support likely

SWAP Under NDIS

- Appears as connection-oriented ATM miniport
  - Supports both CO, CL interfaces
- Requires LAN emulation client and call manager
- Minimal dependency on Windows
  - Only a CP miniport required for NT5
  - Miniport, TAPI Proxy, and RCA Filter required for Win98
    - TAPI Proxy and RCA Filter only have to written once
    - These will be developed in parallel with specification
    - Miniport must be written by each CP manufacturer

SWAP Network Architecture



Why SWAP

- Low cost wireless LAN for resource sharing
- International Band
- Open IP pool similar to IEEE policy
- PC Compatible Cordless Telephones
- PC, CE, and telecommunication companies can work together to differentiate products