

Antenna Beam Pattern of WBS24

The antenna beam pattern of WBS24 is described as follows:

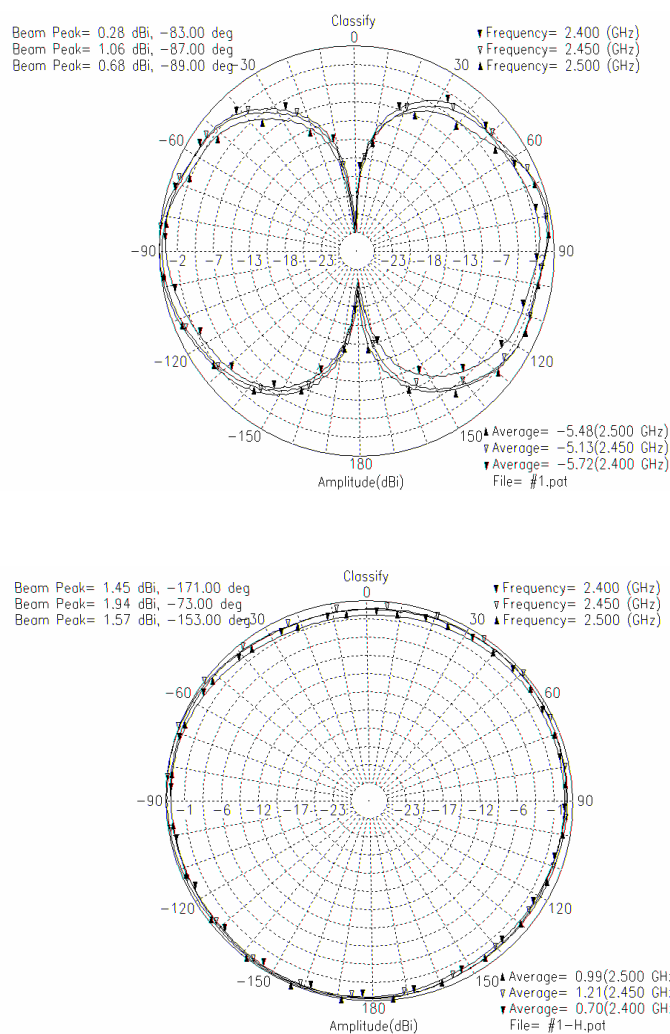


Figure B.1 Antenna Beam Pattern of WBS24

WLAN (802.11b/DSSS) Standard

This section introduces the characteristics and specifications of the 802.11b/DSSS standard, wireless LAN standard.

1 Comparison with Other Standards

Table 1 Comparison with Other Standards of WLAN (802.11b/DSSS)

Standard Name	Frequency Used	Payload Transfer Rate	Modulation Method	Characteristics
IEEE802.11b	2400~2483.5 MHz (US, Canada, ETSI) 2400~2497 MHz (Japan)	1/2/5.5/11 Mbps	FHSS, BPSK, QPSK, CCK(DSSS)	CSMA/CA
IEEE802.11a	5 GHz	6/9/~36/48/54 Mbps	OFDM	CSMA/CA
ETSI/BRAN HiperLAN/Type2 ARIB HiSWANa	5 GHz	6/9/~36/48/54 Mbps	OFDM	Connection type
Bluetooth IEEE802.15.1	2.4 GHz	1 Mbps	FHSS	Hybrid type
HomeRF SWAP	2.4 GHz	10 Mbps	FHSS	Hybrid type
PWR	-	-	-	-

2 Dynamic Frequency of Each Channel/Nation

Table 2 Dynamic Frequency of Each Channel/Nation of WLAN (802.11b/DSSS)

Channel	Frequency (MHz)	Local US/ Canada	ETSI (European Telecommunications Standards Institute)	Spain	France	Japan
1	2412	Operating	Operating	-	-	-
2	2417	Operating	Operating	-	-	-
3	2422	Operating	Operating	-	-	-
4	2427	Operating	Operating	-	-	-
5	2432	Operating	Operating	-	-	-
6	2437	Operating	Operating	-	-	-
7	2442	Operating	Operating	-	-	-
8	2447	Operating	Operating	-	-	-
9	2452	Operating	Operating	-	-	-
10	2457	Operating	Operating	Operating	Operating	-
11	2462	Operating	Operating	Operating	Operating	-
12	2467	-	Operating	-	Operating	-
13	2472	-	Operating	-	Operating	-
14	2484	-	-	-	-	Operating

3 Definition and Characteristics of Each Layer

3.1 Physical Layer

DSSS Physical Layer

DSSS physical layer diffuses data to 11-bit Barker word before sending the data.

The 11-bit Barker word includes the processing gain of 10.4 dB meeting the standard of FCC Part 15.247. All clients use the same 11-bit Barker word.

The number of channels is 4 and the null-to-null bandwidth is 22 MHz.

Frequency ranges from 2.400 to 2.483 MHz, and includes 3 non overlapping channels.

Modulation method and other information of each data rate are described as follows:

Table 3 Date Rate Information on DSSS Physical Layer

Data Rate	Code Length	Modulation	Symbol Rate	Bits/Symbol
1 Mbps	11(Barker Sequence)	BPSK	1 MSps (Mega Symbol per Sec)	1
2 Mbps	11(Barker Sequence)	QPSK	1 MSps	2
5.5 Mbps	8(CCK)	QPSK	1.375 MSps	4
11 Mbps	8(CCK)	QPSK	1.375 MSps	8

FHSS Physical Layer

FHSS physical layer supports the basic rate of 2-level GFSK 1MBPS, and supports 4-level GFSK 2Mbps as an option.

The number of channels is 79 and the bandwidth of each channel is 1 MHz. Hopping is performs at least 2.5 hops for each second. This is the spreading rule of FCC Part 15.247. This layer has 22 hop patterns.

Infrared Physical Layer

Infrared physical layer uses Pulse Position Modulation(PPM) that has 4 and 6 levels. Dynamic data rates are 1 Mbps and 2 Mbps.

3.2 MAC Layer

MAC layer supports Ad-hoc network and client/server infrastructure network. CSMA/CA uses random back off algorithm not to collide with another medium as well as DCF (Distributed Coordination Function).

PCF(Point Coordination Function) is an option and used to control the priority of a medium.

PCF enables an access point to operate as a point coordinator in the basic service coverage area, and client is given high priority. PCF is suitable for time-bounded service like voice application.

Detailed information on CSMA/CA is described as follows:

Carrier Sense Multiple Access/Collision Avoidance (CSMA/CA)

Since wireless network access is extended the Ethernet(IEEE802.3) access to a wireless network, IEEE802.11 decides CSMA as the basic access that realizes peer to peer.

However, unlike cable medium, data collision is not easily detected. Since there is the station that fails to detect carrier in an area(hidden terminal), reserve transmission time through RTS/CTS frame. CSMA/CA with ack that returns the ack frame that checks transmission is the basic wireless network access.

Since DCF is essential, CTS frame required to be performed smoothly in CSMA or gap required to send ack frame is shorter than IFS when performing RTS frame or data frame.

PCF in an AP and the IFS that responds an error occurrence caused by interruption are separately defined.

3.3 Data Link/Network Layer

IEEE802.11 fully considers the flexibility of network construction, an advantage of wireless LAN. That is implemented in a network model. Network mode defined in IEEE802.11 is classified into Ad-hoc network and Infra network.

Ad-hoc Network

Ad-hoc network consists of terminals, and the terminals directly communicate with each other. Each network is logically identified through Zone ID called as BSS ID. Ad-hoc network uses wireless LAN in a place where no network is established, and is suitable for sharing information or performing collaboration requiring a network.

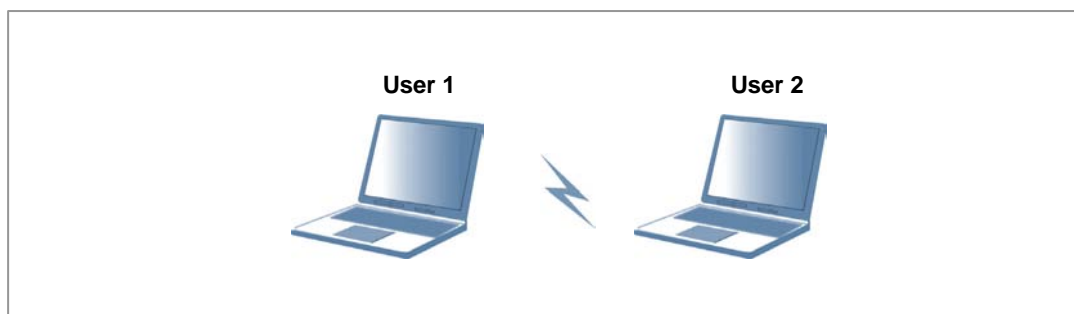


Figure 1 Data Link/Network Layer-Ad-hoc Network Model of WLAN

Infra Network

Infra network includes at least an AP and can communicate with a terminal in another area. Infra network model must include DS(Distribution System) that operates as a medium.

DS is abstract and is included in network model. This enables distributed connection through each BSS ID.

Specification does not describe the implementation method, but the wireless LAN connected to this distribution system is called AP. AP defines protocols of managing the operation of wireless LAN through Infra network in various ways. AP manages the operation of a zone, and creates master and slave terminals in the zone. Thus, AP sends a beacon for the operation zone.

All terminals disable sending user data unless the terminals perform association for AP.



NOTE

Beacon and Association

Beacon is a transmission code that sends the information basically required for wireless LAN.

Association is the case that a terminal accesses an AP.

Wireless LAN provides wireless communication to wireless terminal through AP.

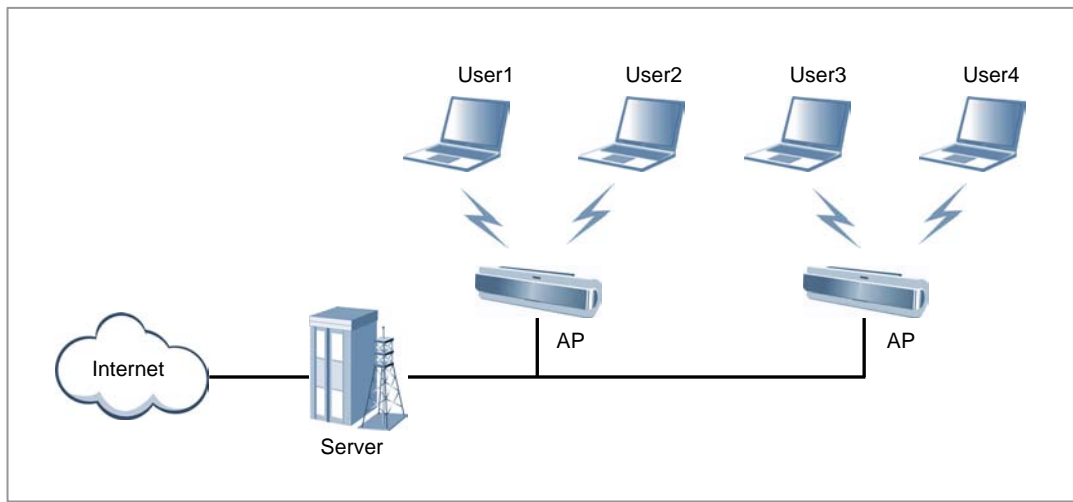


Figure 2 Data Link/Network Layer-Infrastructure Network Model of WLAN

4 WLAN Frame Architecture

4.1 Short PLCP PDU Frame Format

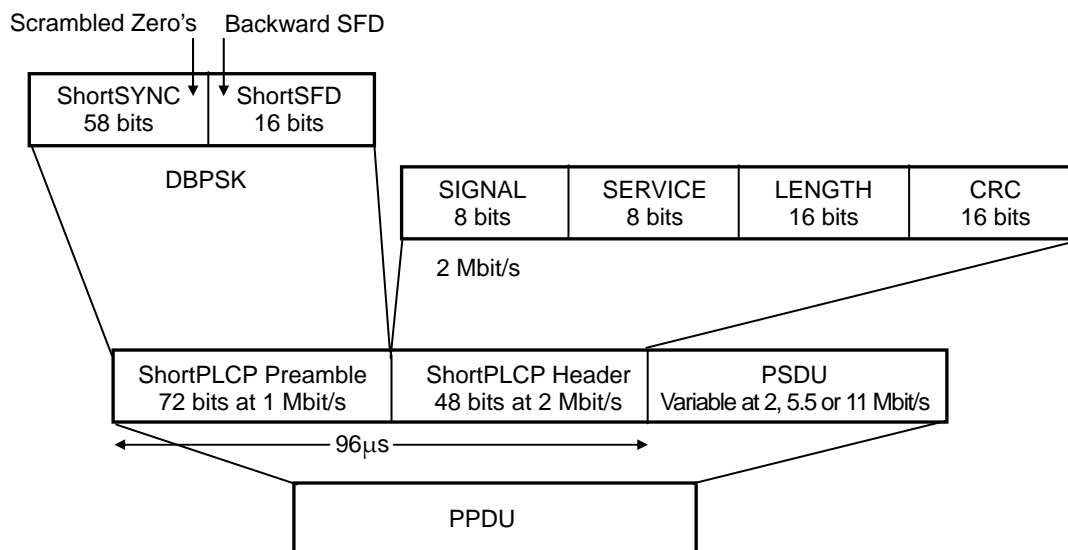


Figure 3 Short PLCP PDU Frame Format of WLAN

4.2 Long PLCP PDU Frame Format

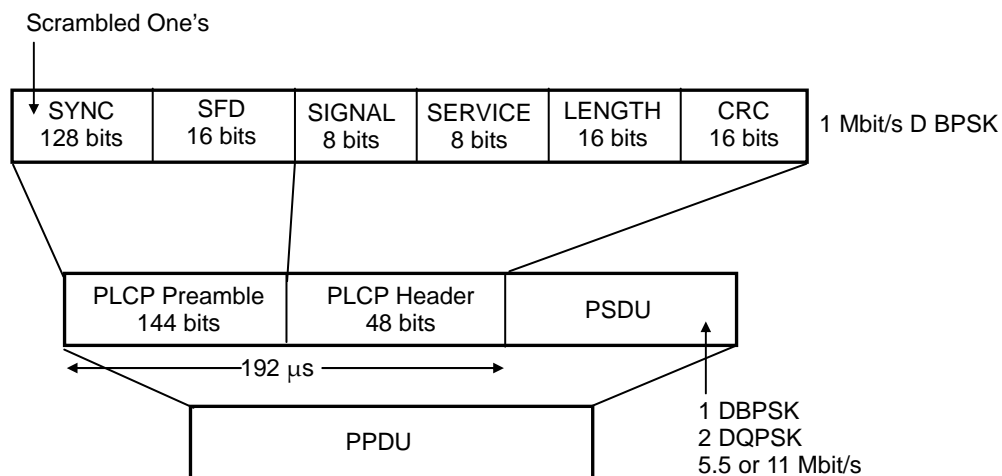


Figure 4 Long PLCP PDU Frame Format of WLAN

5 QoS(Quality of Service)

QoS is a network capability that provides the methods of decreasing network traffic or of reserving required bandwidth. Network administrator provides QoS to a network in various ways. Even if QoS does not guarantee 100 % of bandwidth or 0 % of packet loss rate, a network administrator manages traffic transmission through more effective ways than when QoS is not used.

QoS is a network capability that supports the service capability of a specific network application. The simplest QoS is the QoS that sends network traffic according to the transmission priority. The traffic whose transmission priority is high is sent earlier than the traffic whose transmission priority is low.

6 Security

Through wireless communication, data may be leaked out or disguised. Thus, the encryption method of MAC sublayer is used.

Many AP provides the filtering function using MAC address of a station in the bridge or router. IEEE802.11 uses encryption method by combining the 24-bit key of AP, WEP, and 40- or 104-bit button created in each station through RC4 algorithm of RSA.

Since a key is fixed in each station in IEEE802.11, the key may be interpreted if the key is used for a long time. Thus, IEEE802.11i of the enhanced WEP function is considered. Authentication is considered by IEEE through IEEE802.1x for wireless LAN and Ethernet against intrusion into a network.