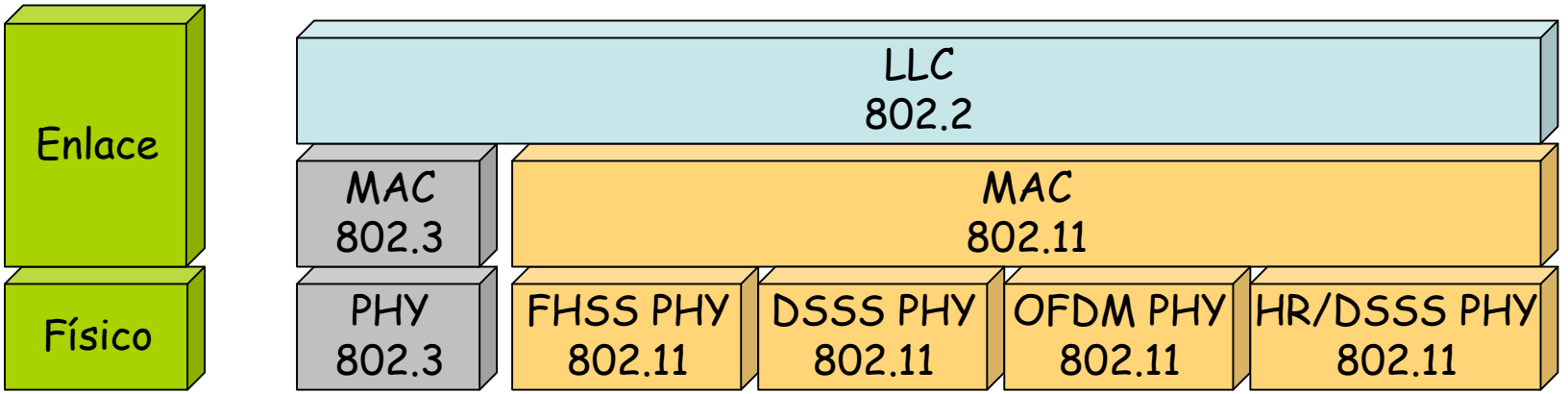
Tecnologías Wi-Fi

Area de Ingeniería Telemática
http://www.tlm.unavarra.es

Redes de Banda Ancha
5º Ingeniería de Telecomunicación

Estándar Wireless LANs

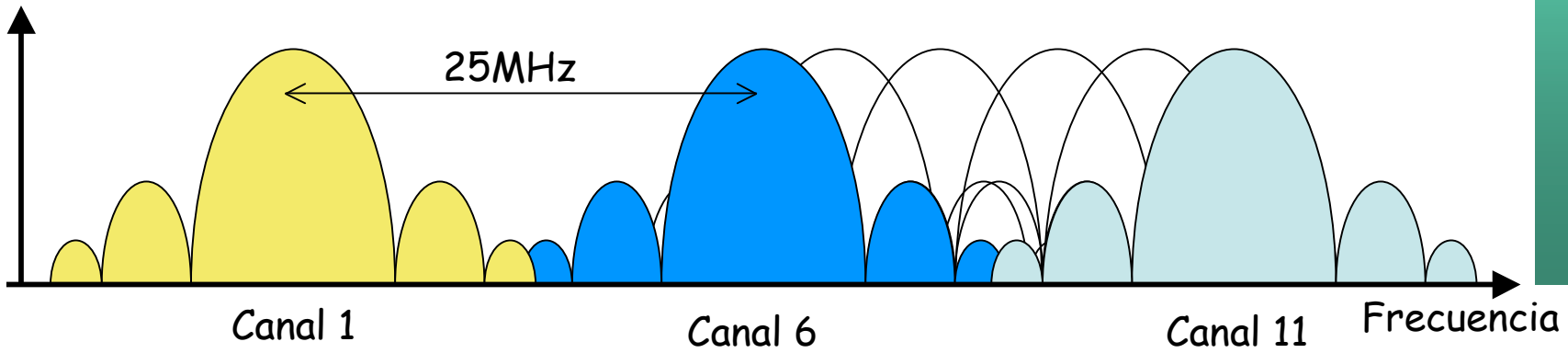
- IEEE 802.11 (1999)
- LAN basada en medio inalámbrico
- Certificación de la Wi-Fi Alliance (http://www.wi-fi.org/)
- Hay diferentes niveles físicos posibles
- MAC 802.11 es común a todos ellos
- MAC intenta ofrecer un acceso justo al medio
- El nivel físico está dividido en dos subniveles:
  - PLCP: Physical Layer Convergence Procedure
  - PMD: Physical Medium Dependent

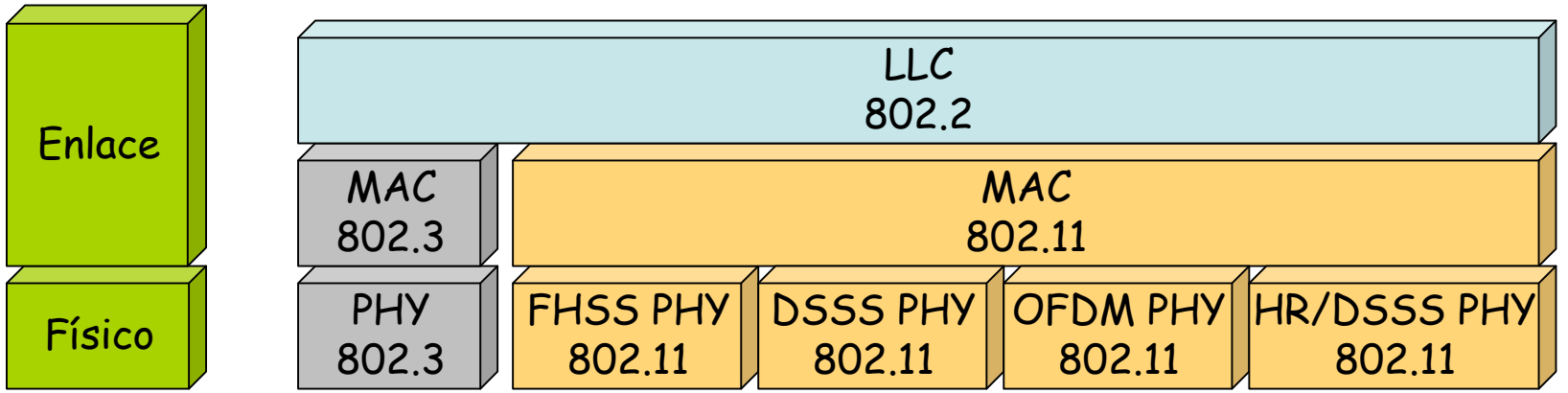


Nivel físico

802.11b

- HR/DSSS = *High Rate Direct-Sequence Spread Spectrum* (hasta 11Mbps)
- En EEUU 11 canales (14 en Japón, 12 en Europa-ETSI)
- BW aprox. de un canal menor de 25MHz (atenuación mayor de 30dB)
- Separación entre canales de 5MHz
- Canales 1-6-11 tienen ya escasa interferencia





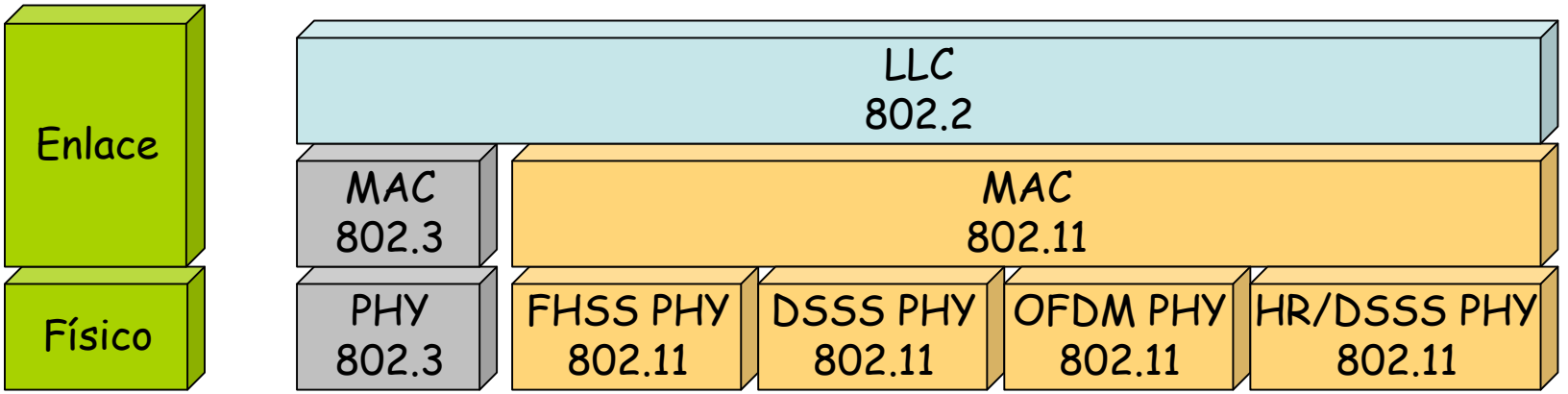
Nivel físico

802.11a

- OFDM = *Orthogonal Frequency Division Multiplexing*
- Hasta 19 canales que no se solapan

802.11g

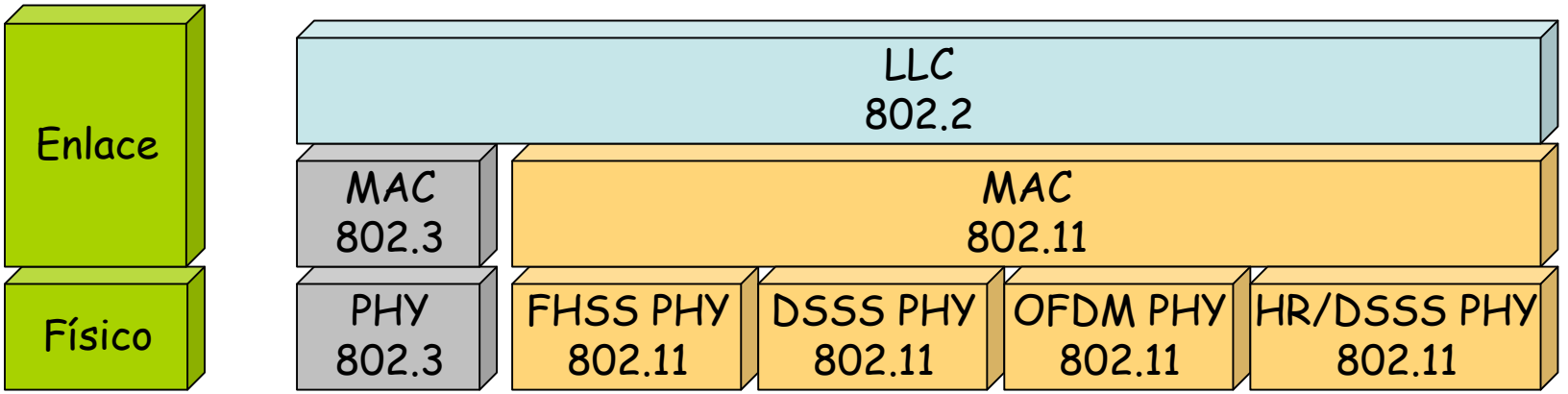
- OFDM = *Orthogonal Frequency Division Multiplexing*
- Compatible con 802.11b



Nivel físico

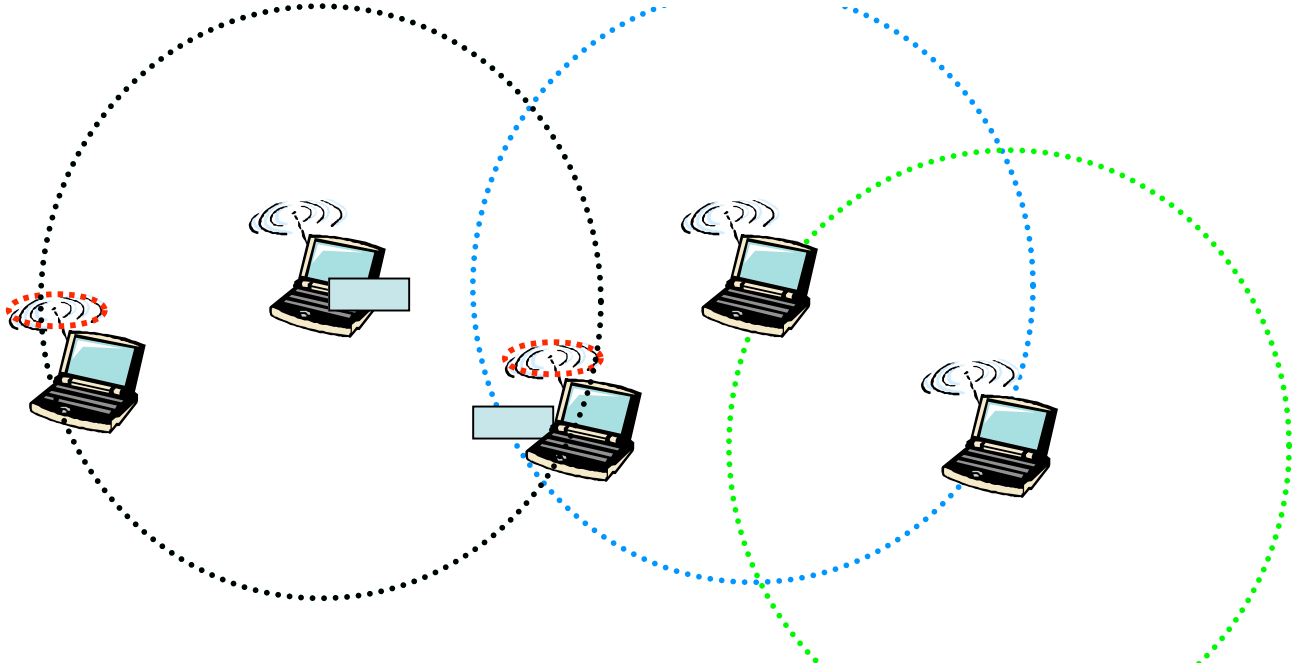
- Emplean bandas que no requieren licencia
  - 2.4 - 2.5 GHz es la *C-Band Industrial, Scientific and Medical* (ISM) (Por ejemplo los hornos microondas, algunos teléfonos inalámbricos, etc)
  - *Unlicensed National Information Infrastructure bands* (en torno a 5GHz)

Estándar	Velocidad Máx	Frecuencia
802.11	2 Mbps	2.4 GHz
802.11a	54 Mbps	5 GHz
802.11b	11 Mbps	2.4 GHz
802.11g	54 Mbps	2.4 GHz
802.11n	¿ 540 Mbps ?	¿ 2.4 ó 5 GHz ?



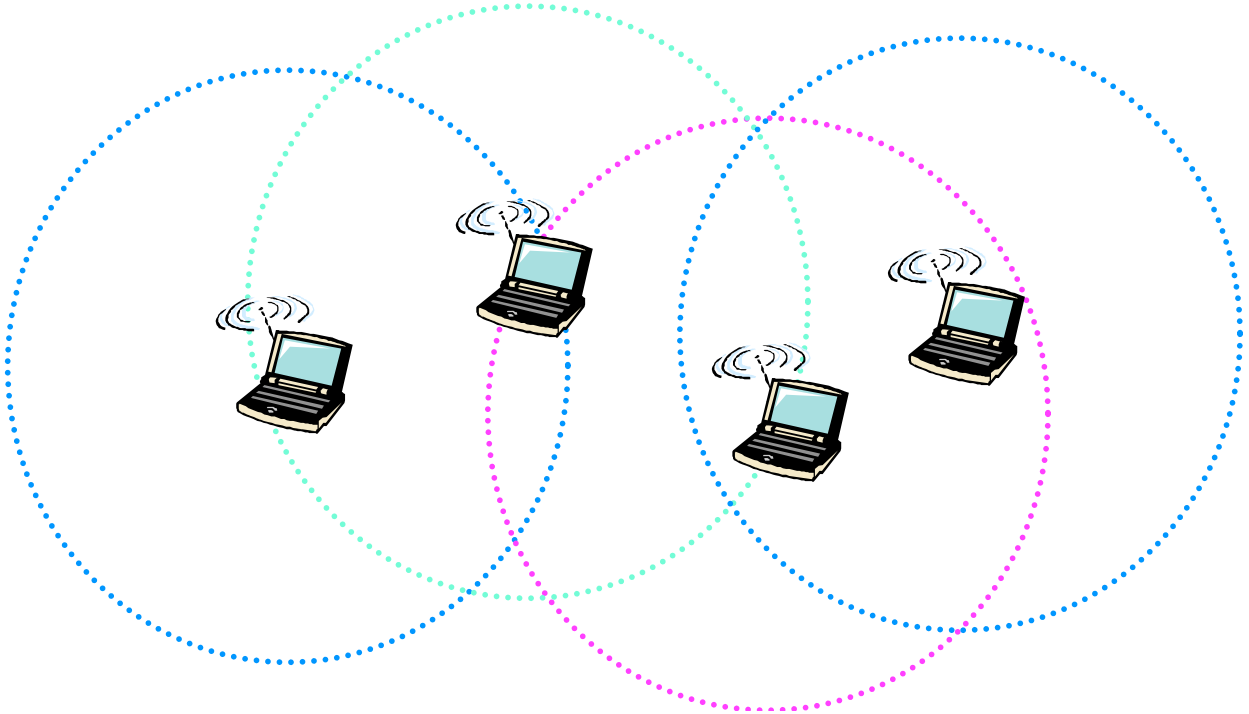
Wireless LANs

- Para el usuario una WLAN funciona como una Ethernet compartida
- MAC 802.11 intenta ofrecer un acceso justo al medio
- Las estaciones no poseen la capacidad de detectar colisiones (no CSMA/CD)
- Los dispositivos hacen broadcast de la señal de radio (…)
- Un receptor puede estar en el alcance de varios transmisores (…)
- El transmisor antepone a su transmisión un *Service Set Identifier (SSID* ó *BSSID*)
- El receptor usa el SSID para filtrar las señales que desea recibir



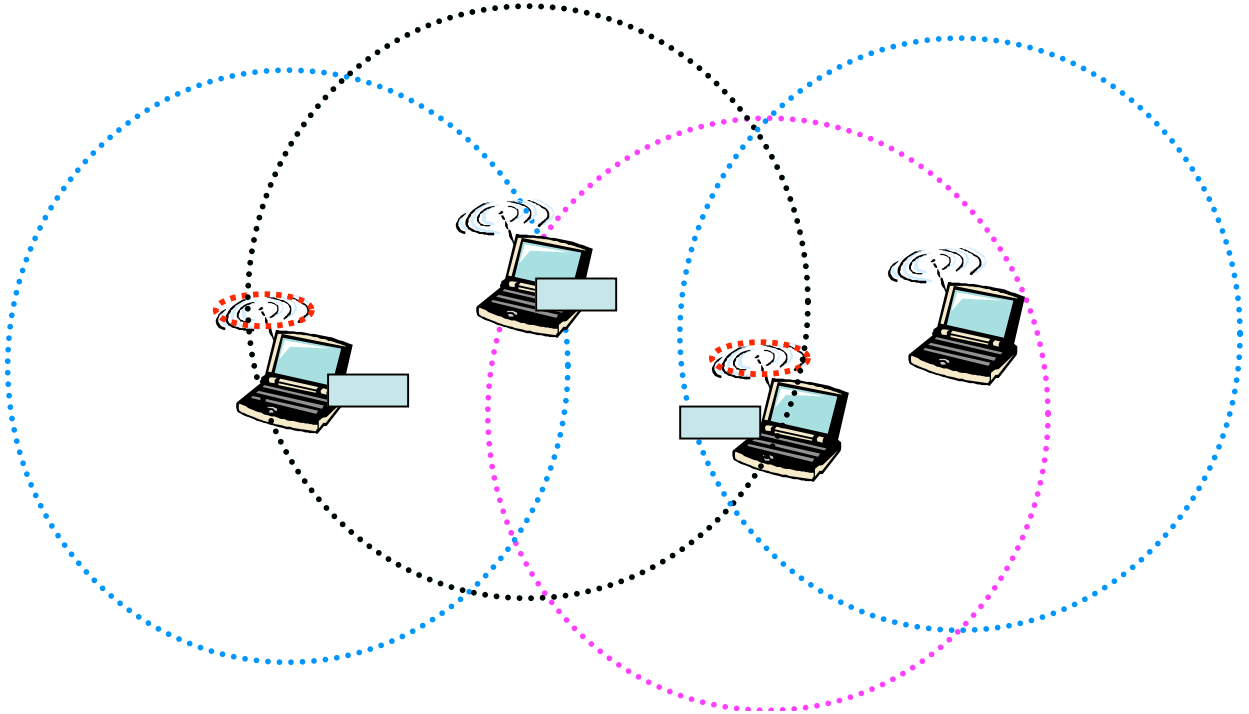
Topologías

- Topologías:
  - *Independent Basic Service Sets (IBSSs)* o *Ad Hoc BSS*
  - *Basic Service Sets (BSSs) o Infraestructure BSS*
  - *Extended Service Sets (ESSs)*
- Un *Service Set* es una agrupación lógica de dispositivos



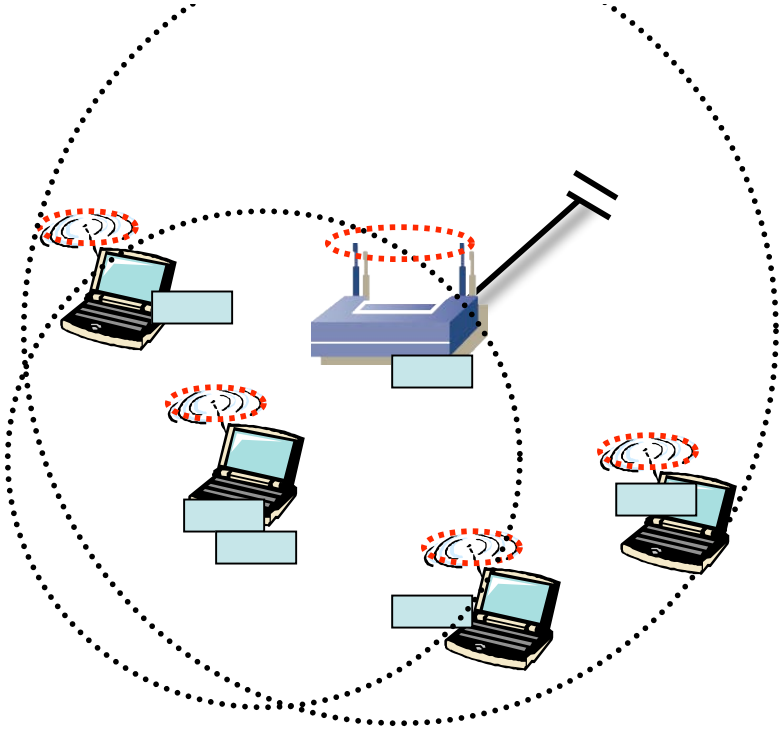
IBSS

- *Independent Basic Service Set ó Ad-hoc network*
- Grupo de estaciones 802.11 comunicándose directamente entre ellas
- Es una WLAN *peer-to-peer* (…)
- Generalmente pequeñas y duran poco tiempo
- No hay límite al número de miembros
- En ocasiones algunos miembros no pueden comunicarse con todos los demás
- BSSID es elegido al azar (número de 48bits empezando por 10)



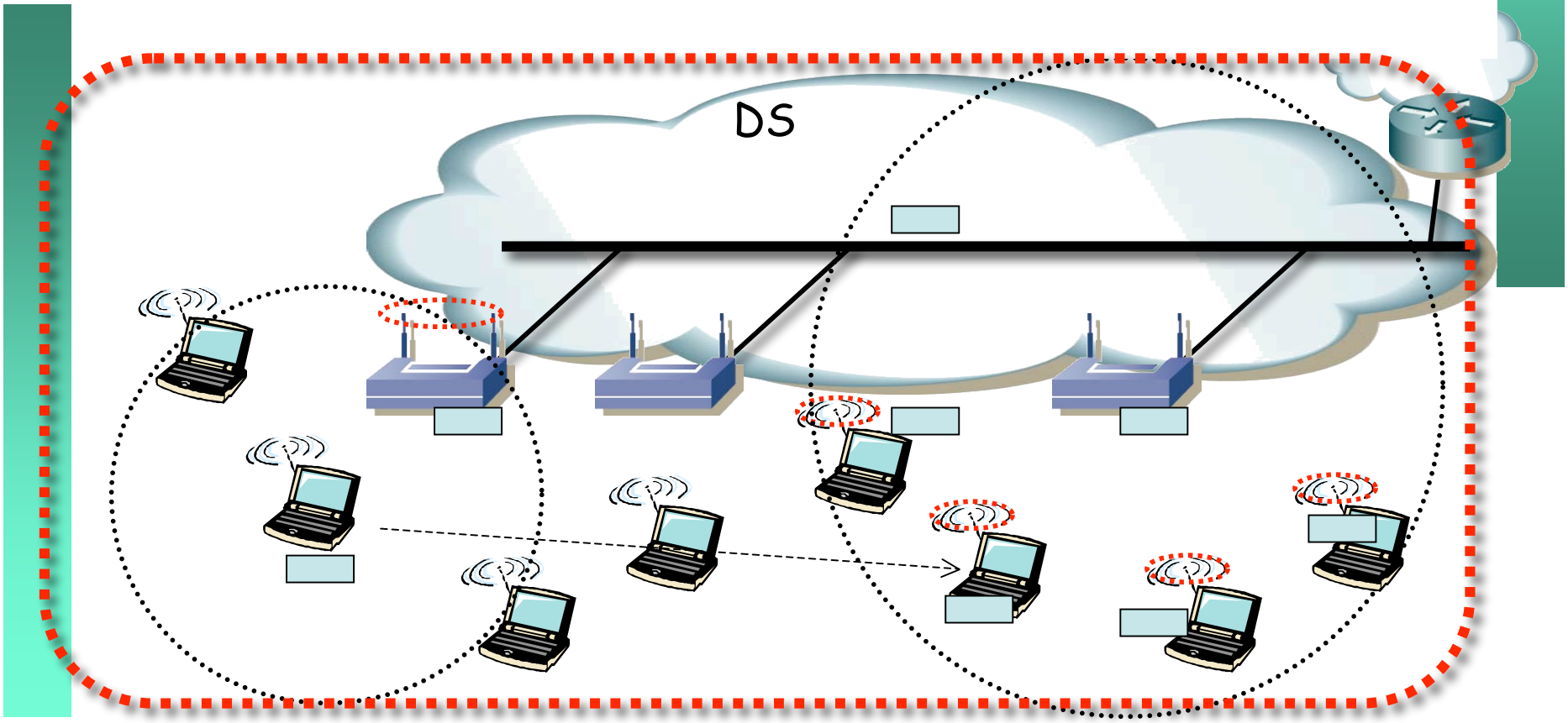
BSS

- *Basic Service Set* o *Infraestructure BSS*
- Incluye una estación especializada: *Access Point (AP)* (Punto de acceso)
- Los clientes no se comunican directamente sino a través del AP (…)
- El AP puede incluir un *uplink* que conecta a red cableada
- BSSID es la MAC Wi-Fi del AP



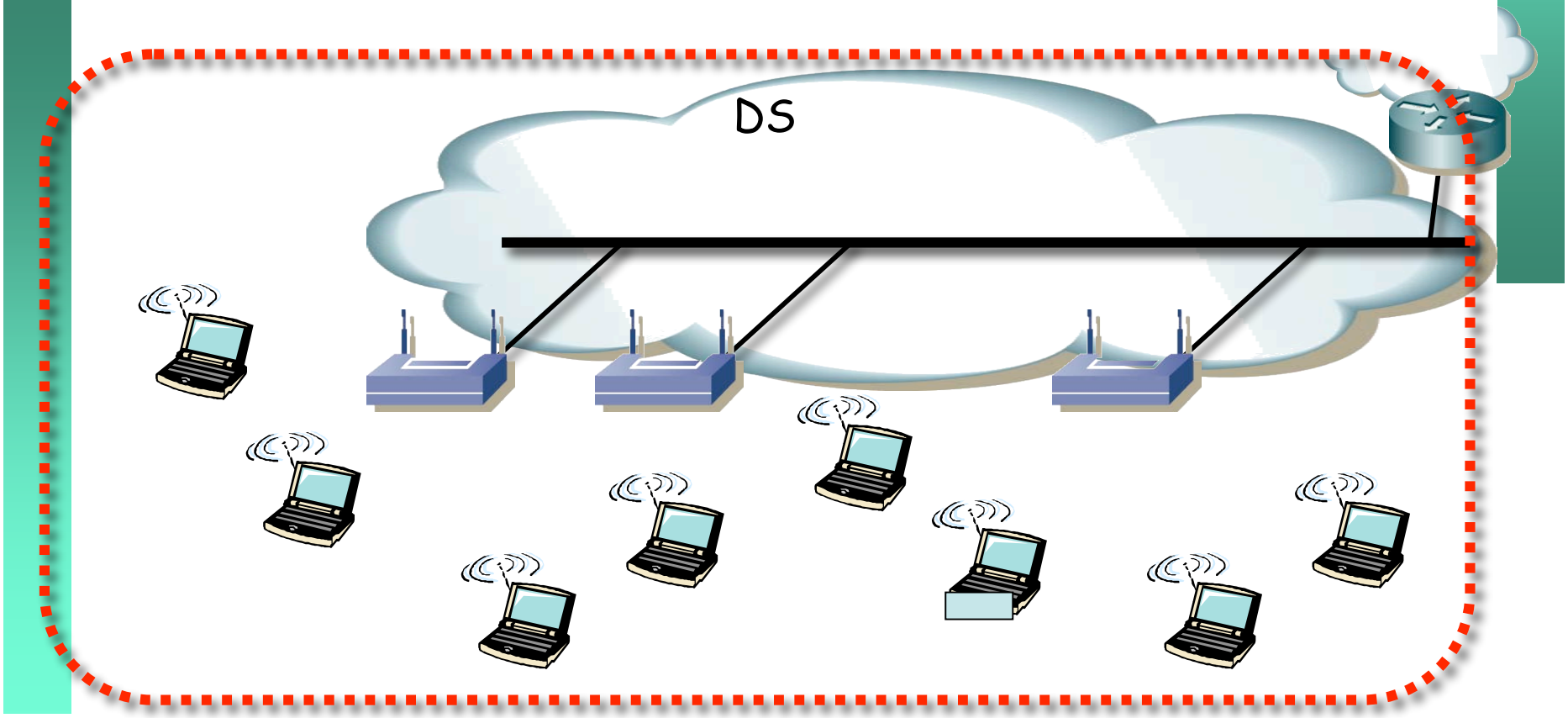
ESS

- *Extended Service Set*
- Varias BSS conectadas por sus interfaces de *uplink*
- Todas empleando el mismo ESS
- Se intercomunican através del *Distribution System (DS)* (… …)



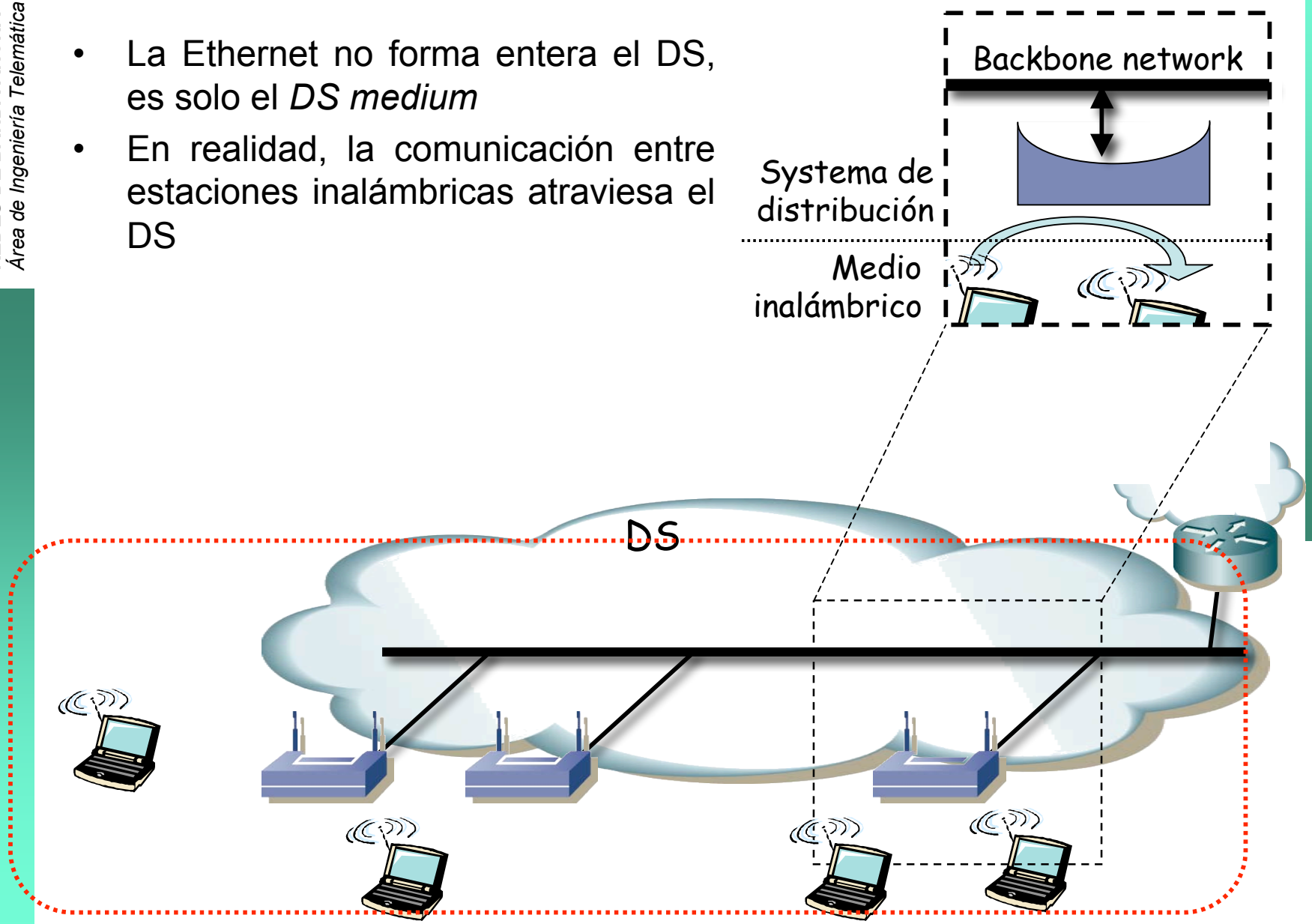
ESS

- El DS normalmente está creado en base a una Ethernet
- Podría emplearse un DS inalámbrico (*WDS = Wireless Distribution System*)
- En cualquier caso debe ser una LAN (nivel 2)
- El AP actúa como un puente



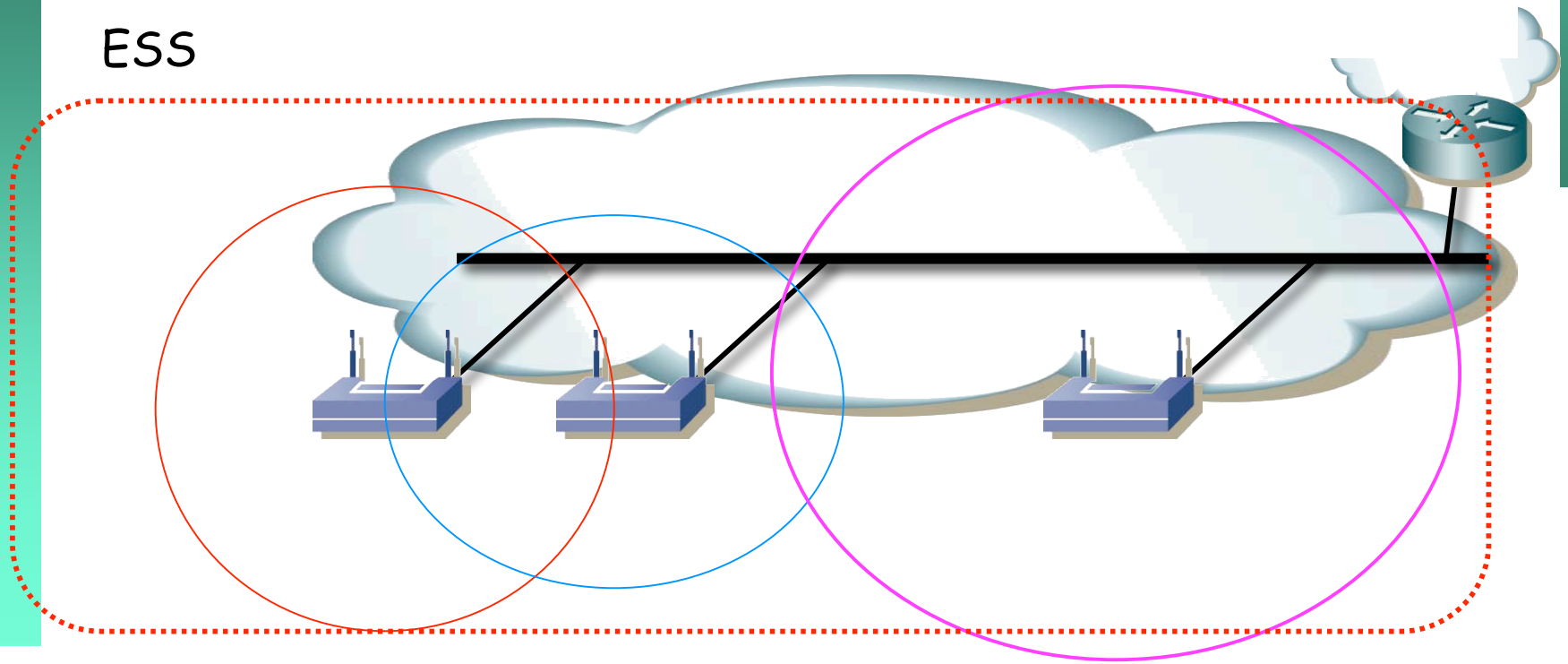
ESS

- La Ethernet no forma entera el DS, es solo el *DS medium*
- En realidad, la comunicación entre estaciones inalámbricas atraviesa el DS



Movilidad

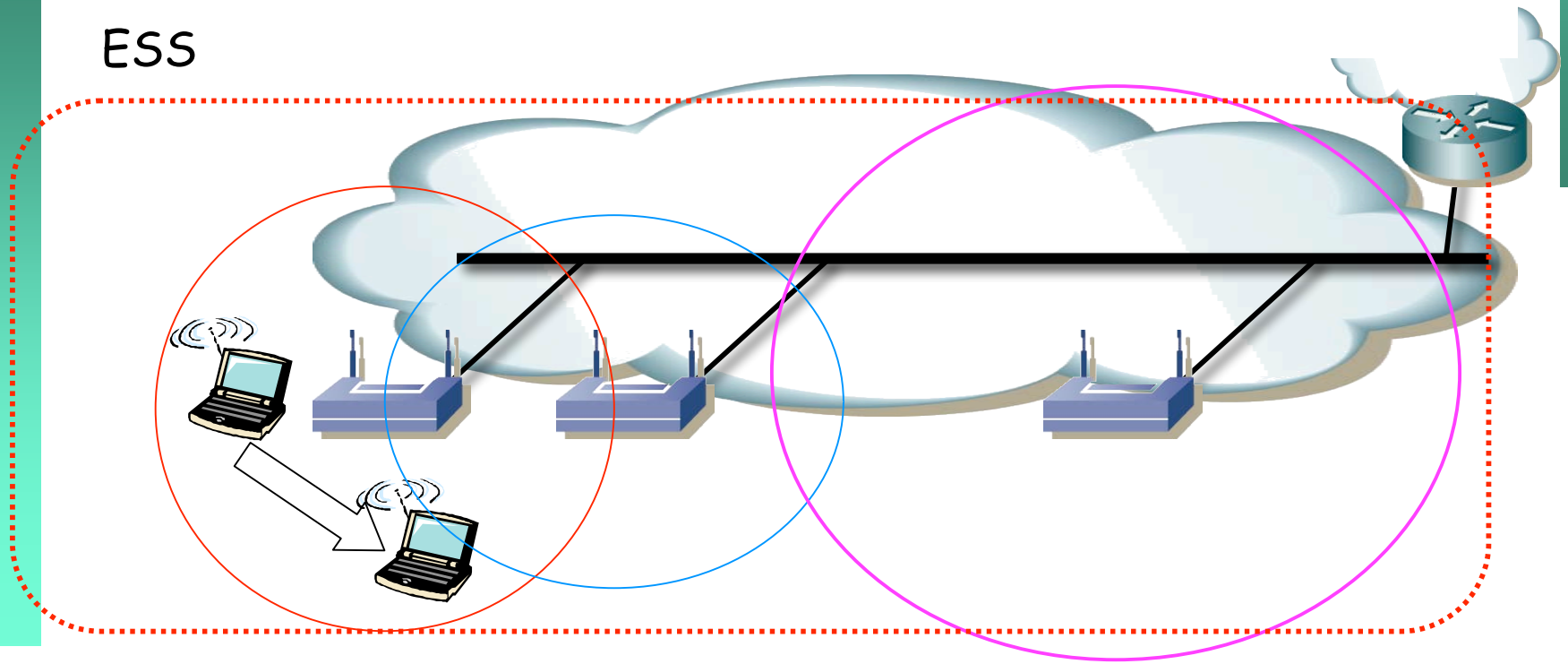
- 802.11 ofrece movilidad en el nivel de enlace
- Transparente para los niveles superiores
- Todo el contenido de un ESS es la misma LAN
- El ESS sabe hacer llegar una trama a donde esté el destino



Movilidad

Sin transición

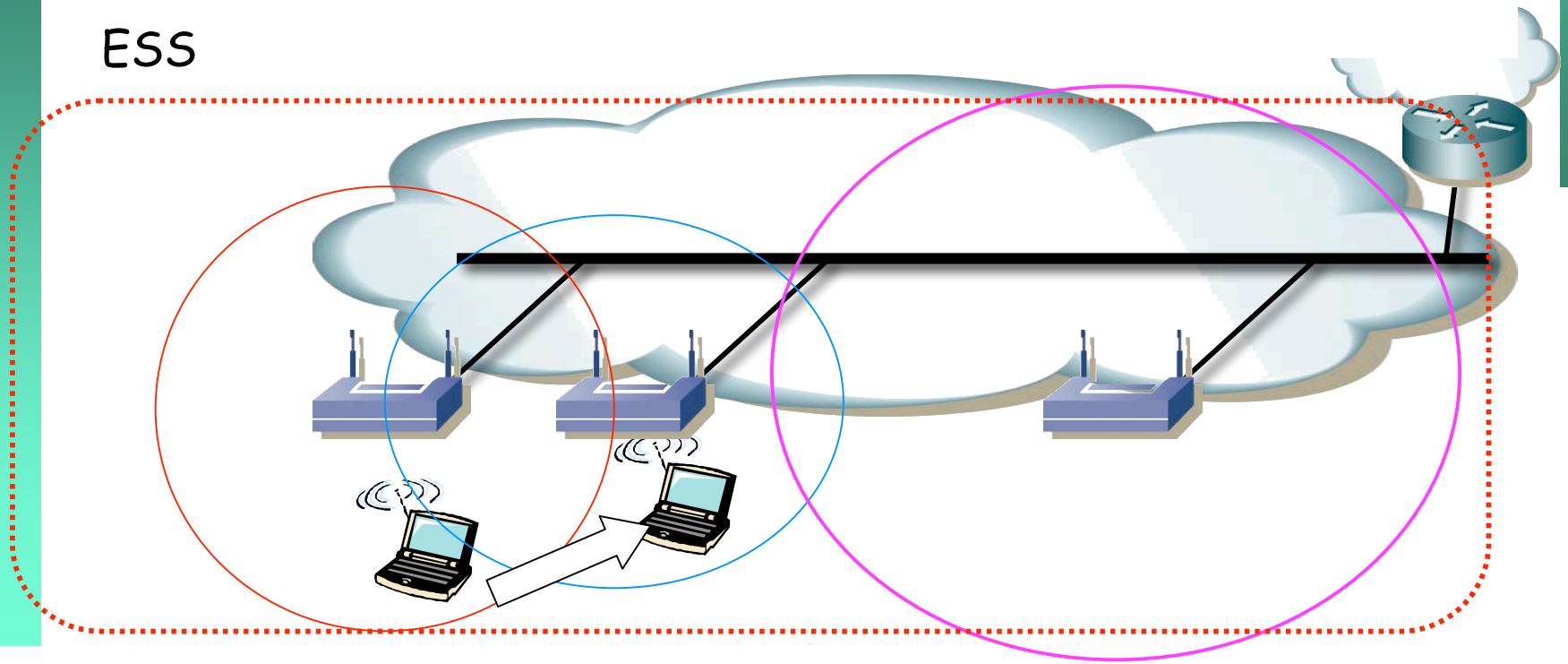
- Estaciones se mueven dentro del área de covertura de un mismo AP



Movilidad

Transición BSS

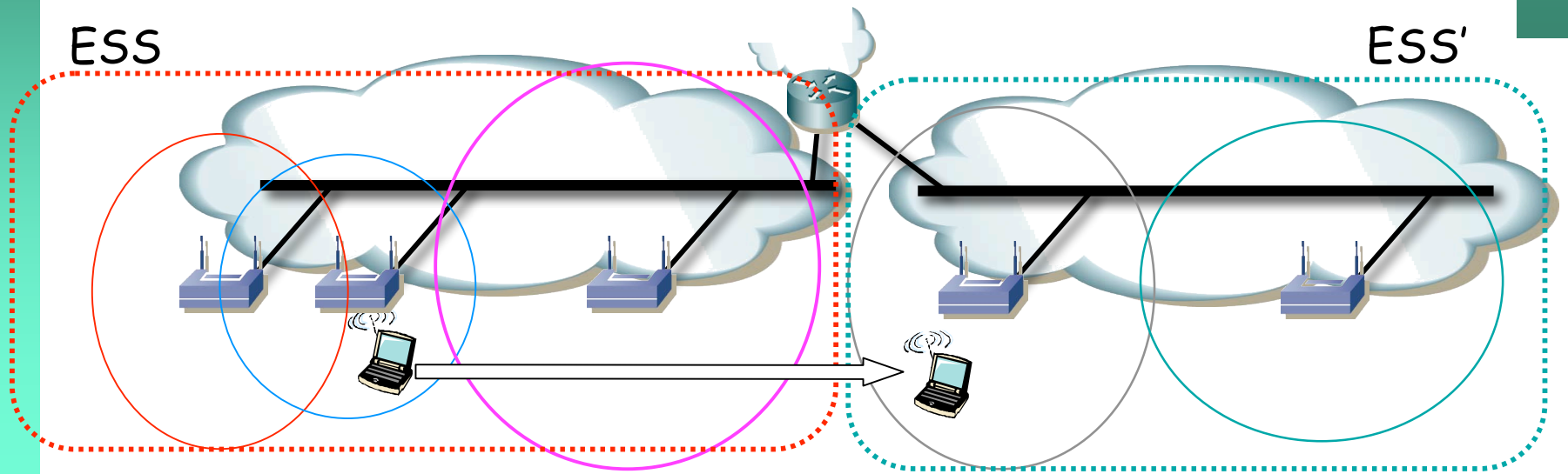
- Estaciones se mueven dentro de un mismo ESS cambiando de AP
- Reasociación, normalmente al detectar otro AP con más potencia
- Requiere cooperación entre los APs para conocer a cuál se encuentra asociado el usuario
- Durante bastante tiempo esa cooperación no estuvo estandarizada. Hoy en 802.11F



Movilidad

Transición ESS

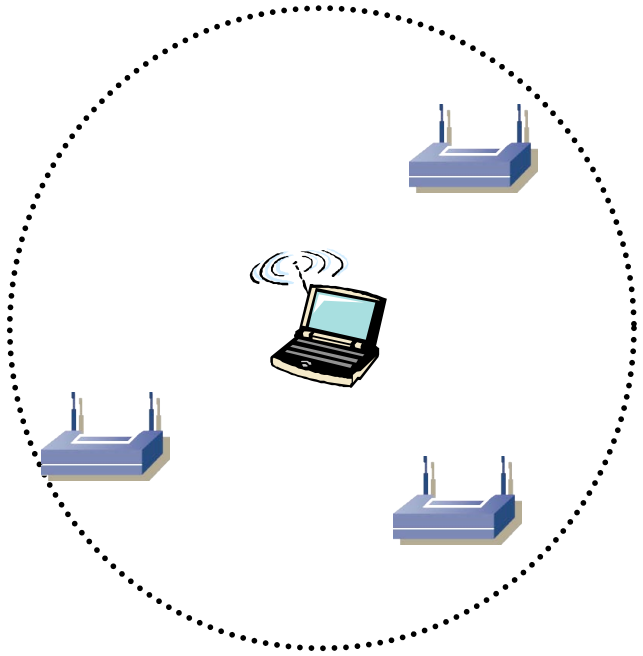
- De un ESS a otro distinto
- No soportado por 802.11
- Comunicación de capas superiores se ve interrumpida
- Se creará una nueva asociación y nueva configuración de red
- Para TCP/IP existe la posibilidad de *Mobile IP*



Unirse a un BSS

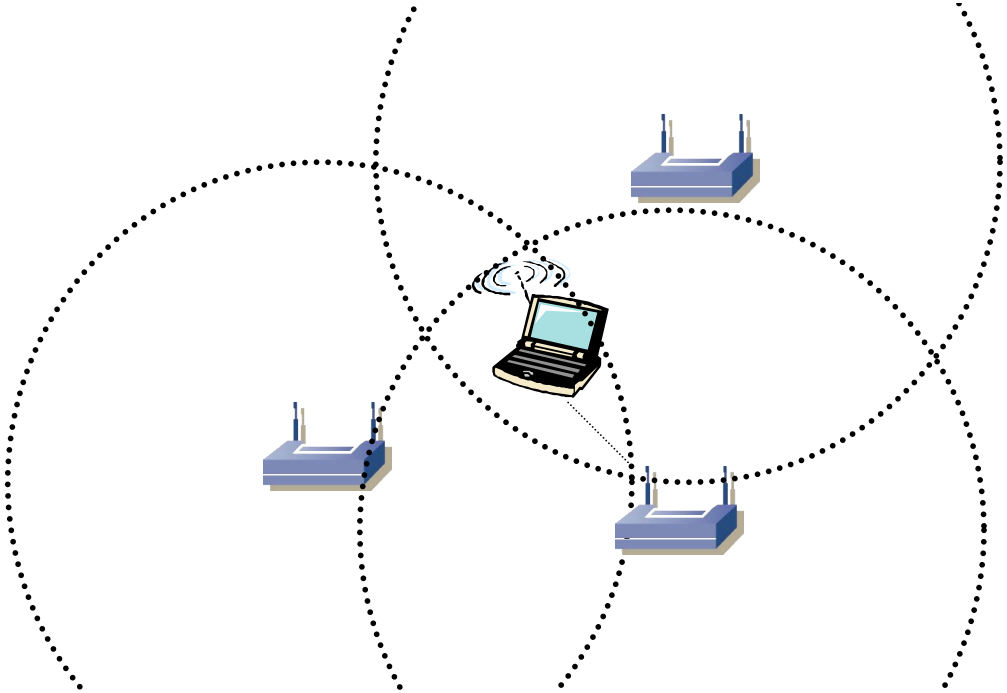
Proceso de sondeo

- Usuario envía una trama de sondeo (*probe*) (…)
- Normalmente en todos los canales que soporta
- A la menor velocidad soportada (1Mbps)
- Incluye información sobre las velocidades que soporta y el SSID al que pertenece



Unirse a un BSS

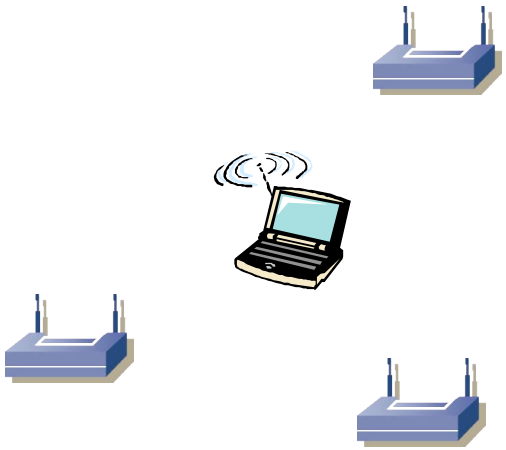
- APs responden (*probe response*) (…)
- El cliente averigua:
  - Potencia de señal con cada uno
  - SSID de cada uno
  - Velocidades soportadas
- Cliente selecciona a cuál asociarse



Unirse a un BSS

Proceso de autentificación

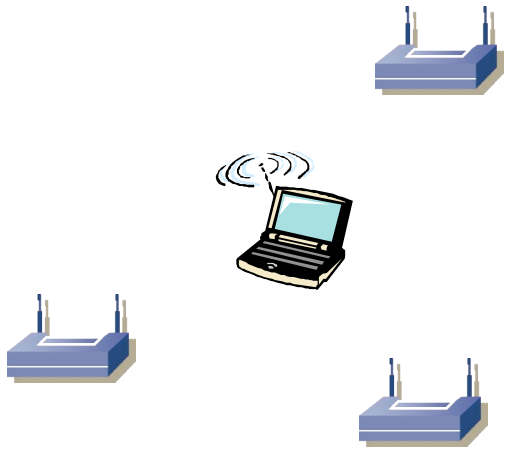
- En la asignatura *"Gestión y Seguridad en Redes de Ordenadores"*



Unirse a un BSS

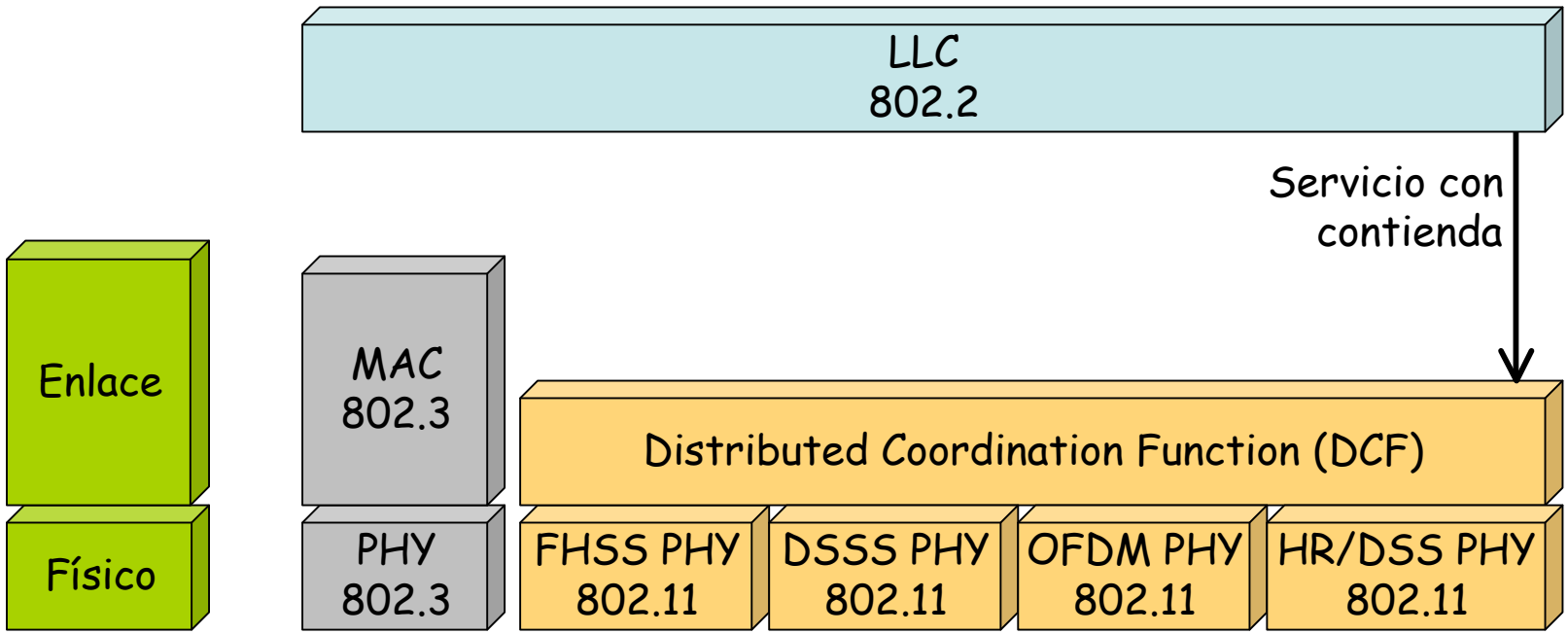
Proceso de asociación

- Cliente envía una trama de solicitud de asociación (*association request*)
- El AP responde (*association response*) con un aceptación o rechazo
- AP asigna un *puerto lógico* al cliente (*AID, Association Identifier)*



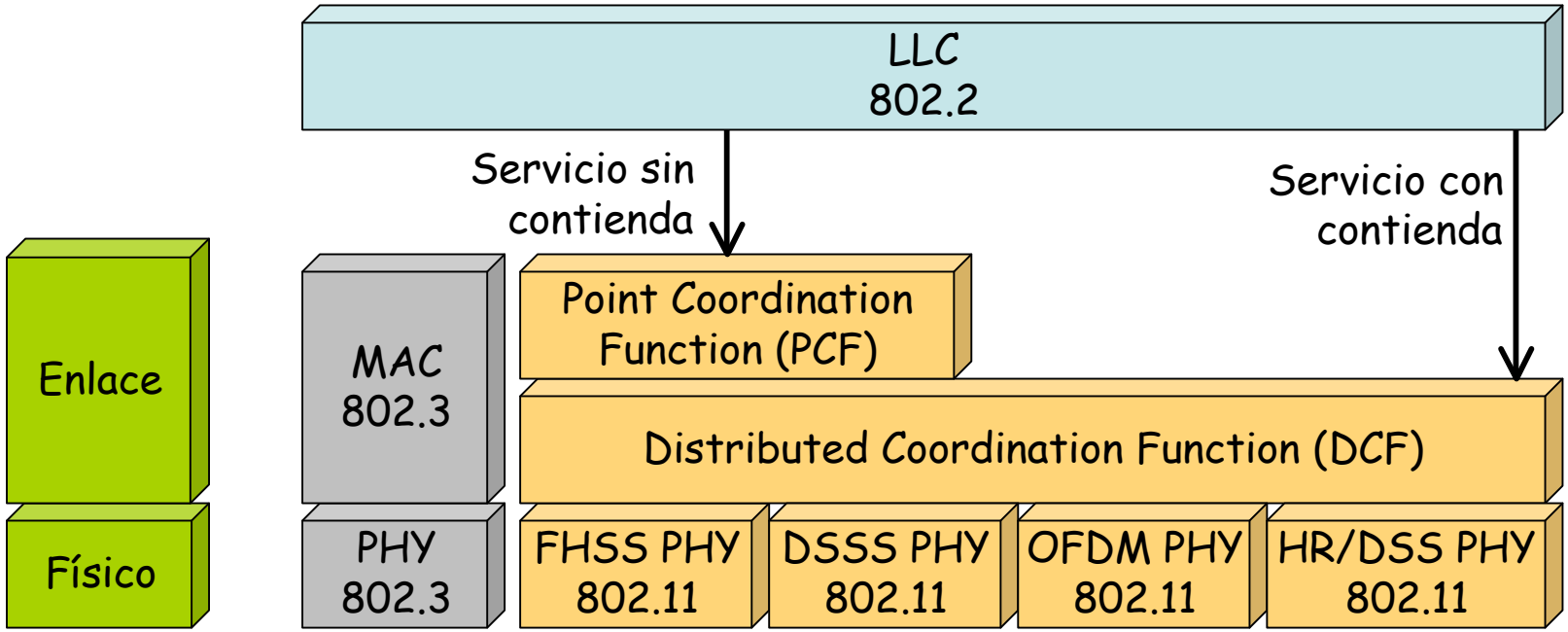
Subnivel MAC

- IEEE 802.3 (Ethernet) usa CSMA/CD
- IEEE 802.11 (Wi-Fi):
  - DCF = *Distributed Coordination Function*
    - CSMA/CA = *Carrier Sense Multiple Access / Collision Avoidance*
    - *Mandatory*
    - Modo infraestructura o *ad-hoc*



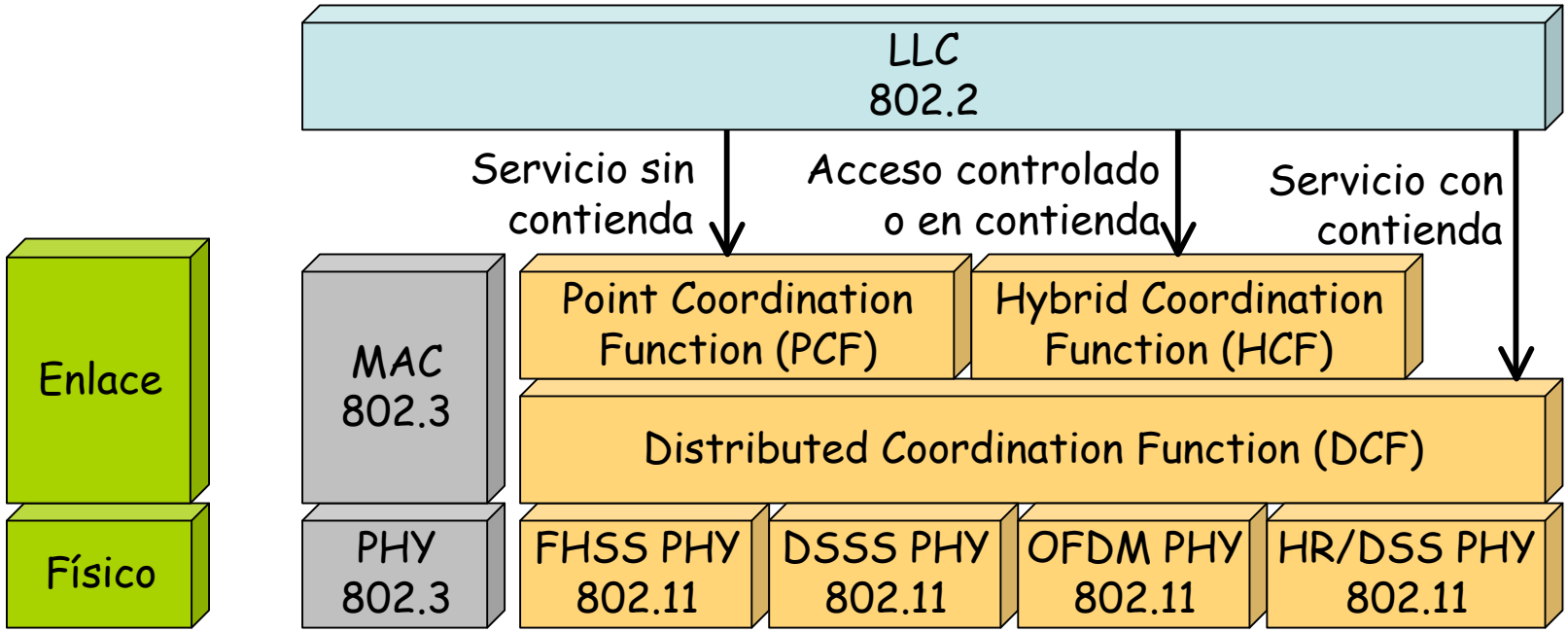
Subnivel MAC

- IEEE 802.3 (Ethernet) usa CSMA/CD
- IEEE 802.11 (Wi-Fi):
  - PCF = *Point Coordination Function*
    - Solo para modo infraestructura
    - Sin contienda (hay un coordinador)
    - Poco implementada



Subnivel MAC

- IEEE 802.3 (Ethernet) usa CSMA/CD
- IEEE 802.11 (Wi-Fi):
  - HCF = *Hybrid Coordination Function*
    - Permite QoS sin los requisitos rigurosos de PCF
    - 802.11e



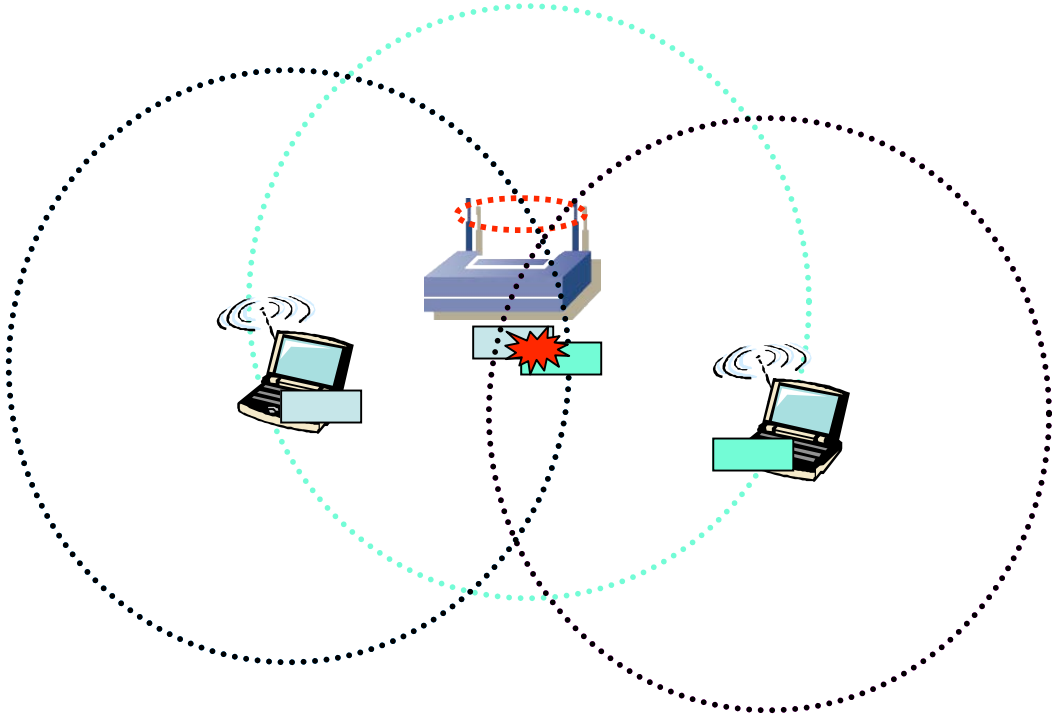
Subnivel MAC

Conveniente un cierto conocimiento en detalle:

- Para comprender las diferentes soluciones para hacer la red segura
- Para solucionar problemas de red (*packet sniffing*)
- Para poder optimizar parámetros de la misma
- Para ajustar parámetros de los drivers
- Para comprender las mejoras que se van ofreciendo en nuevos productos y estándares

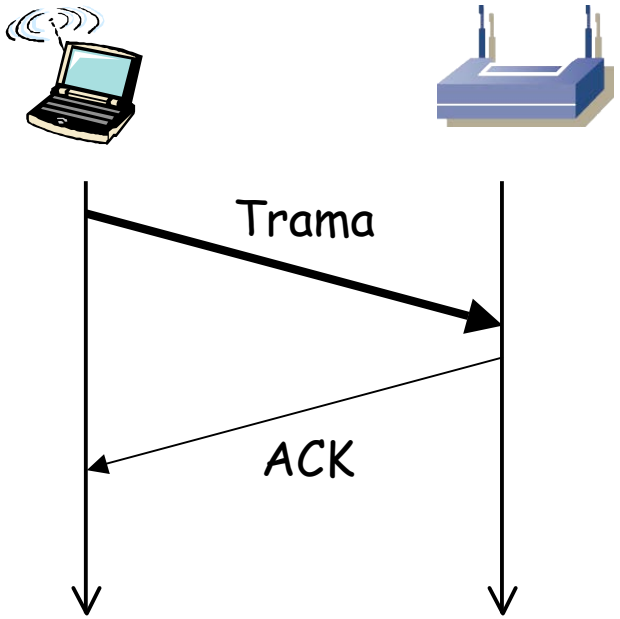
MAC

- Emplea un método CSMA (*Carrier Sense Multiple Access*)
- ¿Detección de colisiones?
  - Puede que la trama que provoca la colisión en el receptor no lo haga en el emisor (…)
  - Las estaciones no tienen la capacidad de detectar colisiones



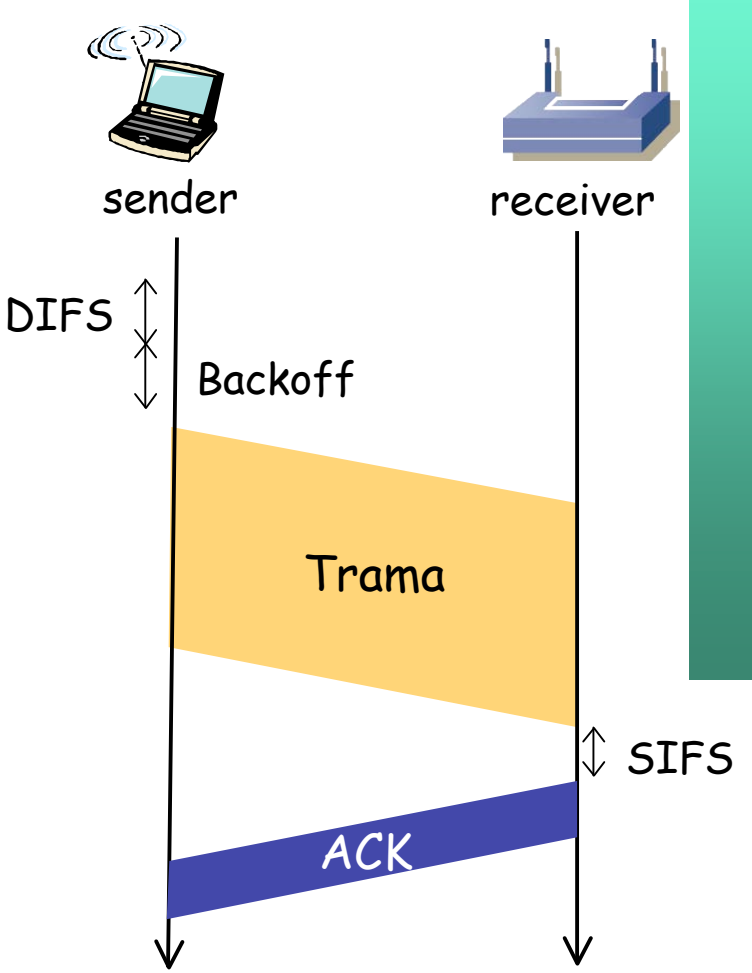
MAC

- El ruido es difícil de controlar (bandas libres)
- 802.11 emplea confirmaciones positivas
- La secuencia de trama+ack es una operación atómica (todo o nada)
- Tramas a la MAC de broadcast no son confirmadas (ni multicast)



CSMA/CA

- ***Carrier Sense*:** Si se detecta el medio inactivo durante el tiempo suficiente (DIFS) la estación puede enviar una trama
- ***Random Backoff***: Genera un valor al alzar de tiempo que espera (entre CW_{min} y CW)
- Si el medio sigue libre envía la trama
- Destinatario espera un tiempo (SIFS, con SIFS<DIFS) y envía una confirmación
- Si no recibe ACK duplica CW, genera un nuevo backoff aleatorio, espera y retransmite

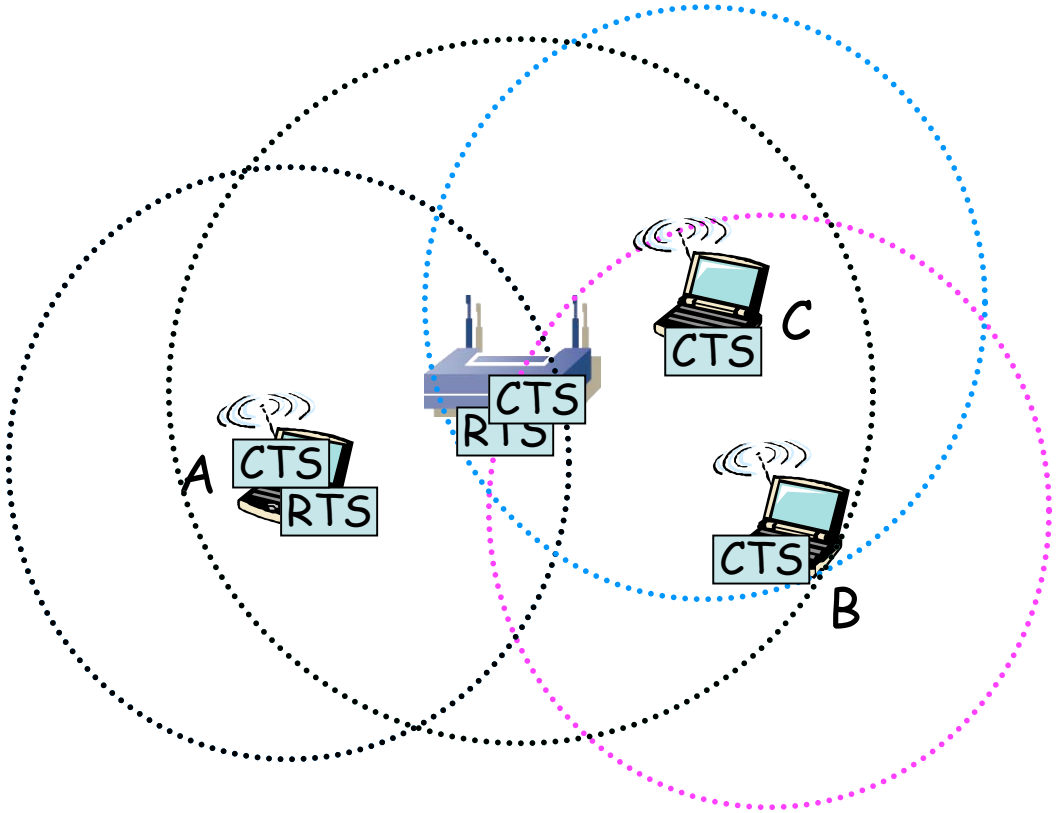


DIFS = *DCF Interframe Space*
SIFS = *Short Interframe Space*

Terminal oculto

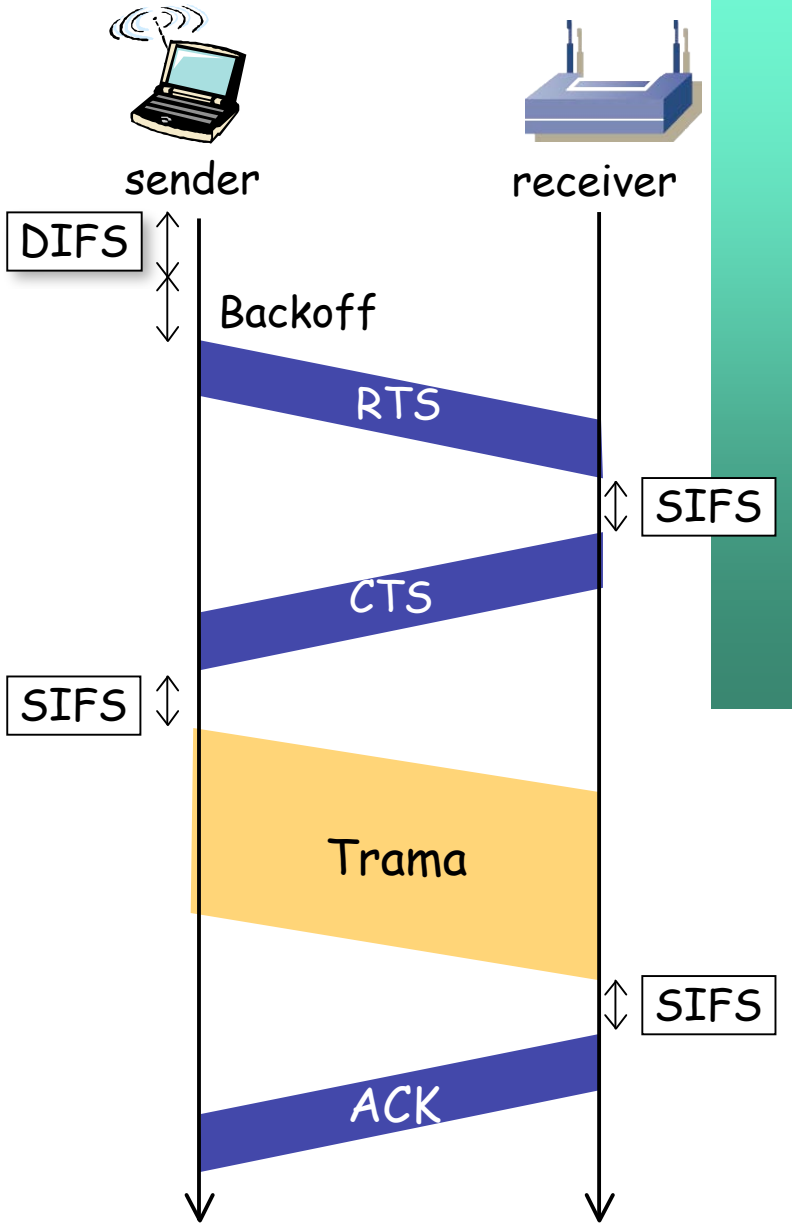
Collision Avoidance

- Reservar previamente el canal con una trama corta (menor probabilidad de colisión)
- *Request-To-Send* (RTS) (puede colisionar) (…)
- *Clear-To-Send* (CTS) (nadie más transmite) (… …)



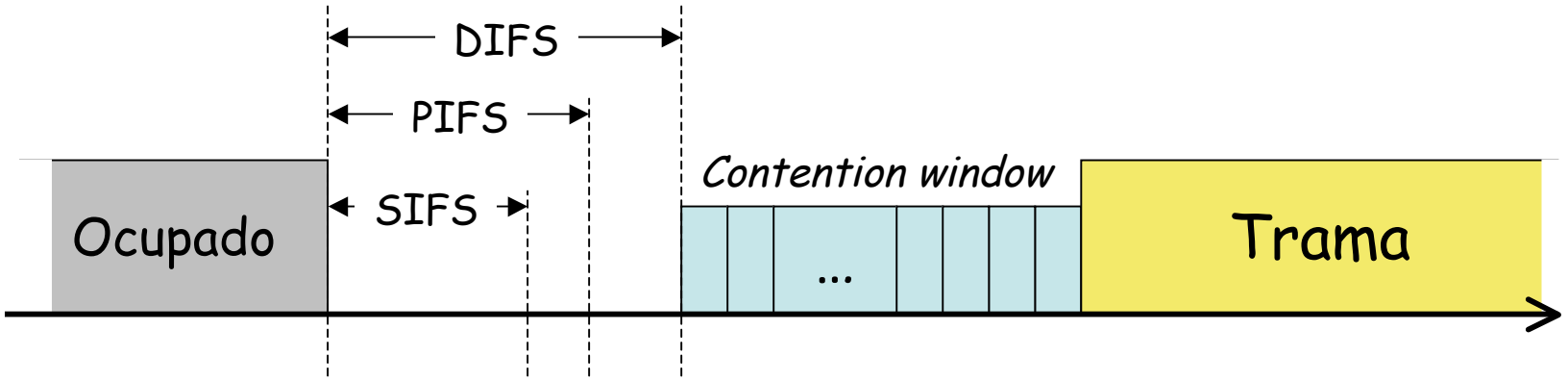
CSMA/CA

- DIFS > SIFS
- RTS/CTS consume capacidad
- Utilizado en entornos con frecuente contienda
- Generalmente solo para tramas grandes
- Throughput obtenible limitado
- Unos 4-6Mbps en 802.11b a 11Mbps
- Unos 30Mbps en 802.11g y 802.11a a 54Mbps



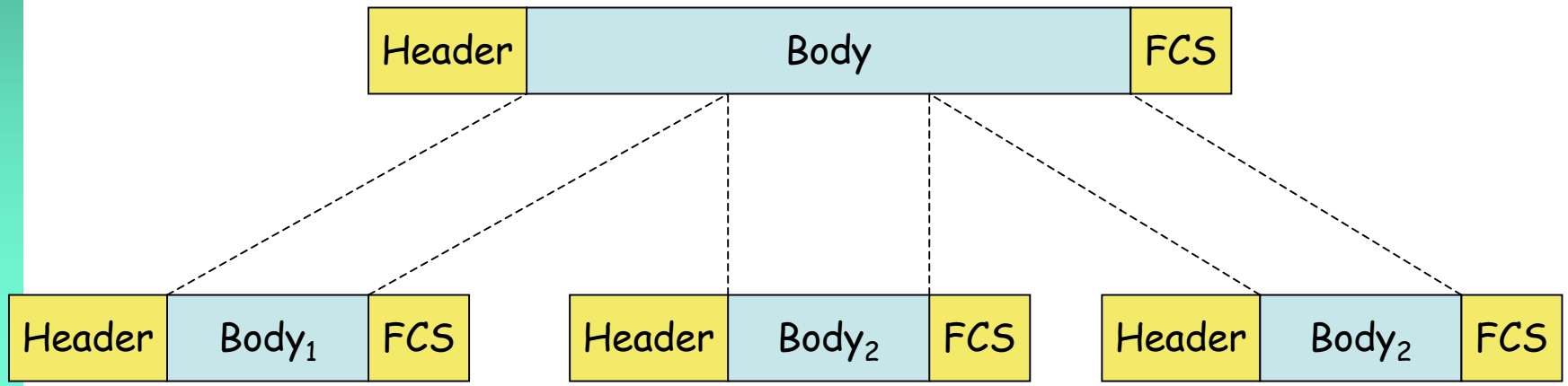
Tiempos entre tramas

- SIFS = Short InterFrame Space
  - Tramas de la máxima prioridad
  - Al transcurrir SIFS μs puede empezar transmisión con lo que el medio pasa a estar ocupado
- PIFS = PCF InterFrame Space
- DIFS = DCF InterFrame Space
- EIFS = Extended InterFrame Space
  - No es un valor fijo
  - Empleado tras un error en la transmisión

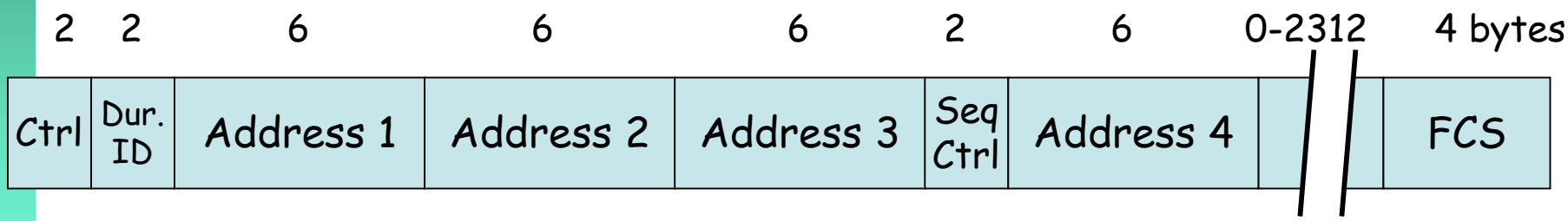


Fragmentación

- Servicio ofrecido en el nivel de enlace
- Divide trama grande en más pequeñas
- Cada fragmento es confirmado por separado
- El transmisor no libera el medio hasta enviar todos los fragmentos
- Aumenta la fiabilidad en la transmisión
- Solo se aplica a tramas *unicast*
- Atención a las diferencias con la fragmentación en el nivel de red



Formato de trama



Frame Control field

Protocol Version

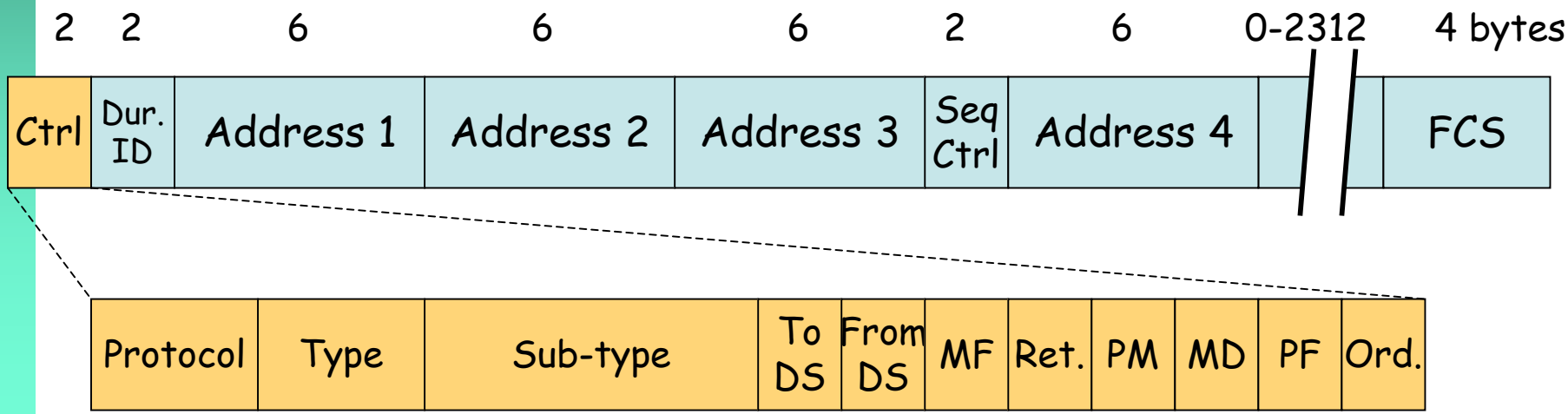
- Versión del 802.11 MAC (hoy hay solo uno de código 0)

Type and Subtype fields

- Tipo de trama
- Hay varias tramas para gestión

ToDS and FromDS

	ToDS=0	**ToDS=1**
From DS=0	Tramas de control. Datos en un IBSS	Datos desde una estación en un BSS
From DS=1	Datos para una estación en un BSS	Datos en un *wireless bridge*



Frame Control field

More Fragments

- 0 en el último
- Normalmente se usa la MTU de Ethernet y no hay fragmentación

Retry

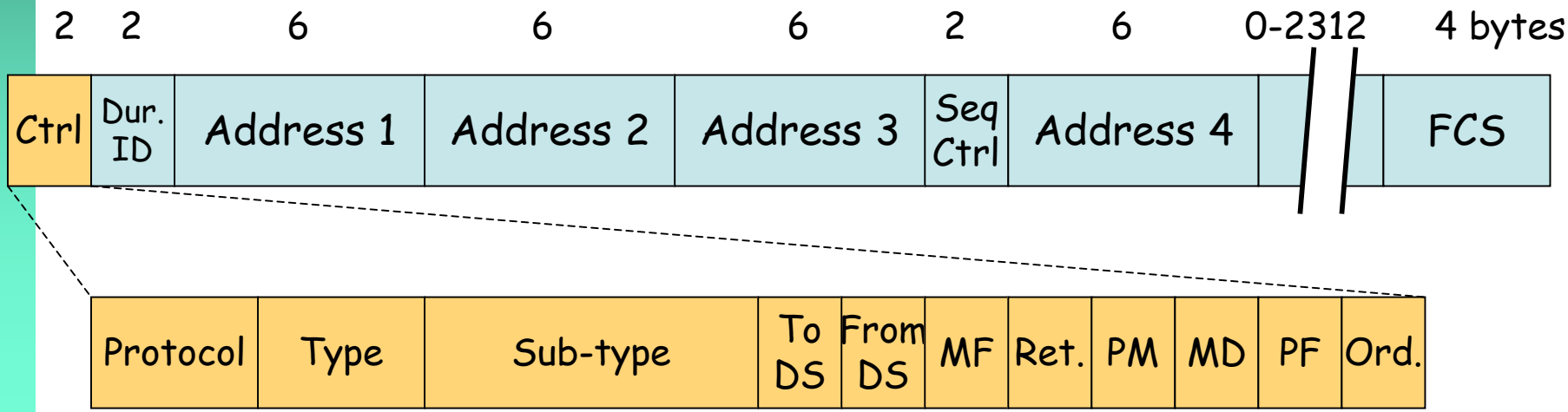
- Indica que es una retransmisión

Power Management

- Indica (con 1) que tras esta trama la estación pondrá el interfaz en ahorro de energía

More Data

- El AP indica a la estación que tiene más datos para ella, que no entre en ahorro de energía



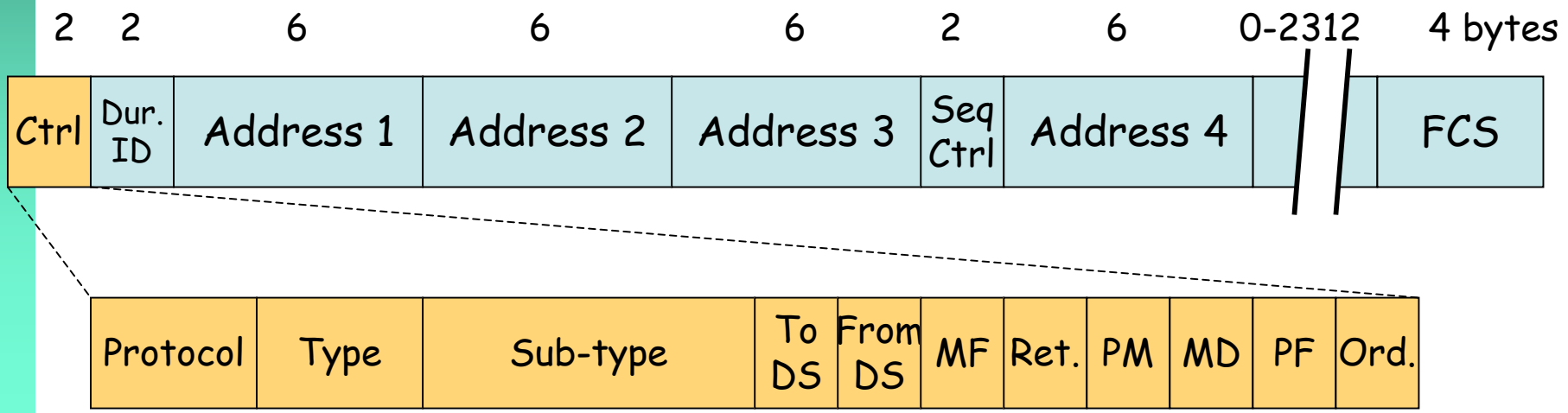
Frame Control field

Protected Frame

- Indica si la trama va encriptada en el nivel de enlace

Order

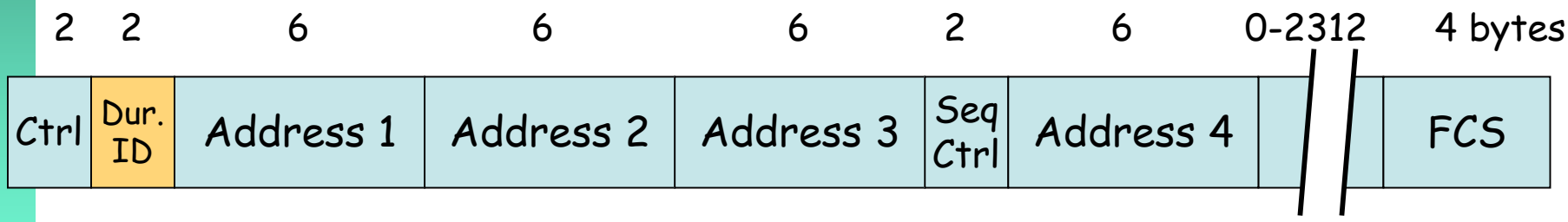
- Si se emplea ordenamiento estricto de las tramas



Frame Control field

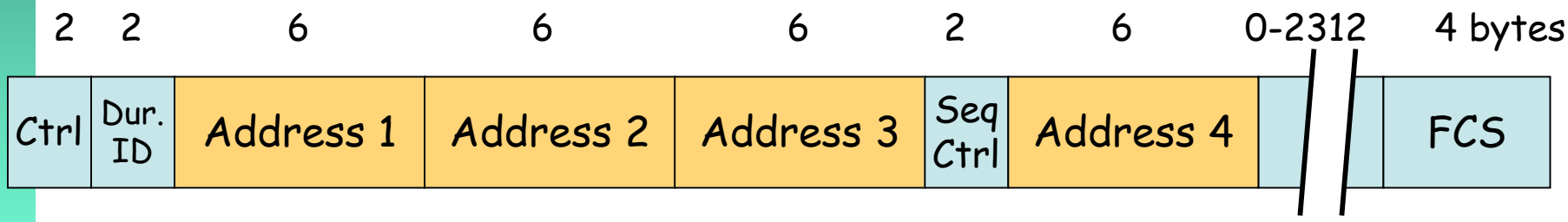
Duration/ID

- Tiempo que el medio estará ocupado por la transmisión de la trama
- Una estación en ahorro de energía envía periódicamente una trama solicitando las tramas acumuladas en el AP para ella (entonces este campo es el ID de su asociación con el AP)



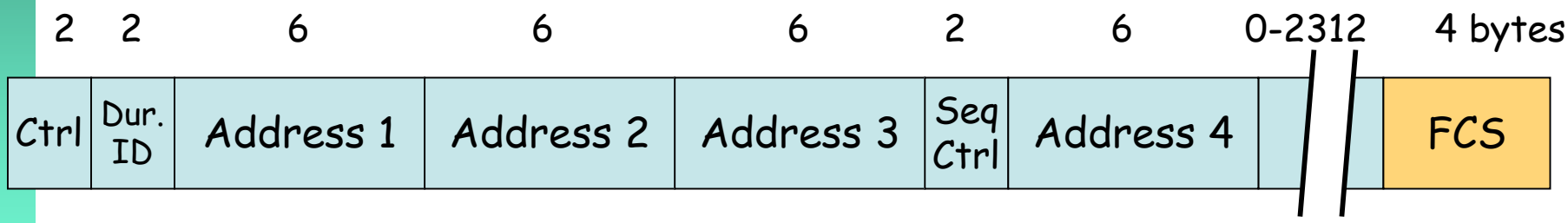
Direcciones

- Hasta 4 direcciones (depende del tipo de trama)
- Mismo espacio de direcciones que 802.3
- Dirección destino: MAC de la estación final
- Dirección origen: MAC de la estación origen
- Dirección del receptor:
  - Si el destino es wireless es su MAC
  - Si el destino está en el DS cableado es la MAC de AP (su interfaz Wi-Fi)
- Dirección del transmisor:
  - Dirección del interfaz inalámbrico que transmite
  - Solo empleado en el caso de un *wireless-bridge*
- *BSSID:* MAC del interfaz Wi-Fi del AP identifica al BSS



FCS

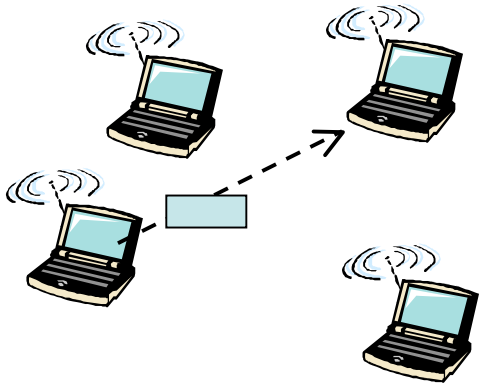
- Cyclyc Redundancy Check (CRC)
- Mismo método que en 802.3
- Como cambia la cabecera debe recalcularlo el AP



Direcciones

IBSS (Ah-hoc)

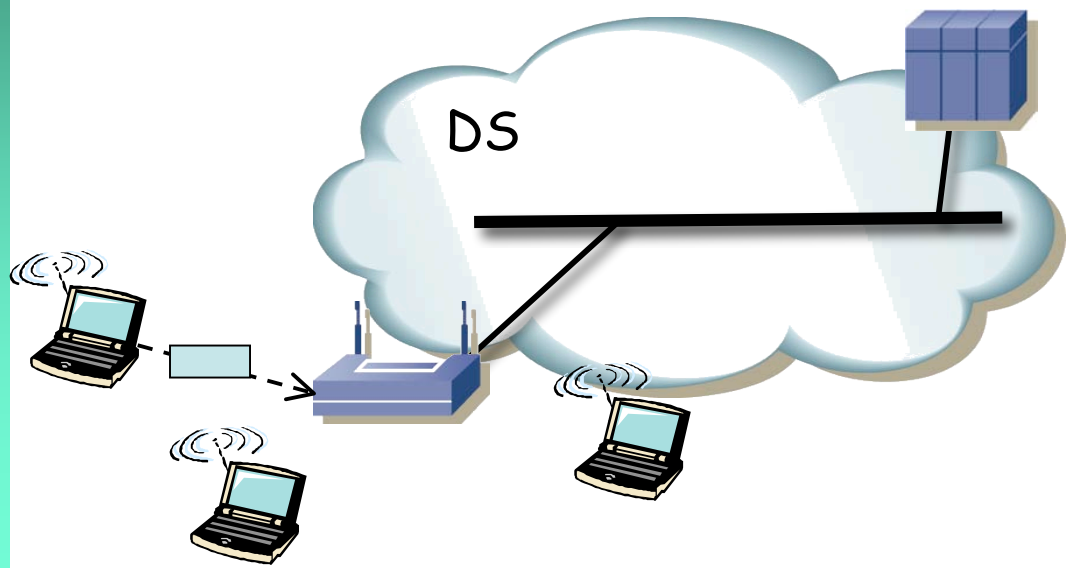
- Address 1 = Dirección destino (MAC estación destino)
- Address 2 = Dirección origen (MAC estación origen)
- Address 3 = BSSID
- Address 4 = No usada



Direcciones

BSS

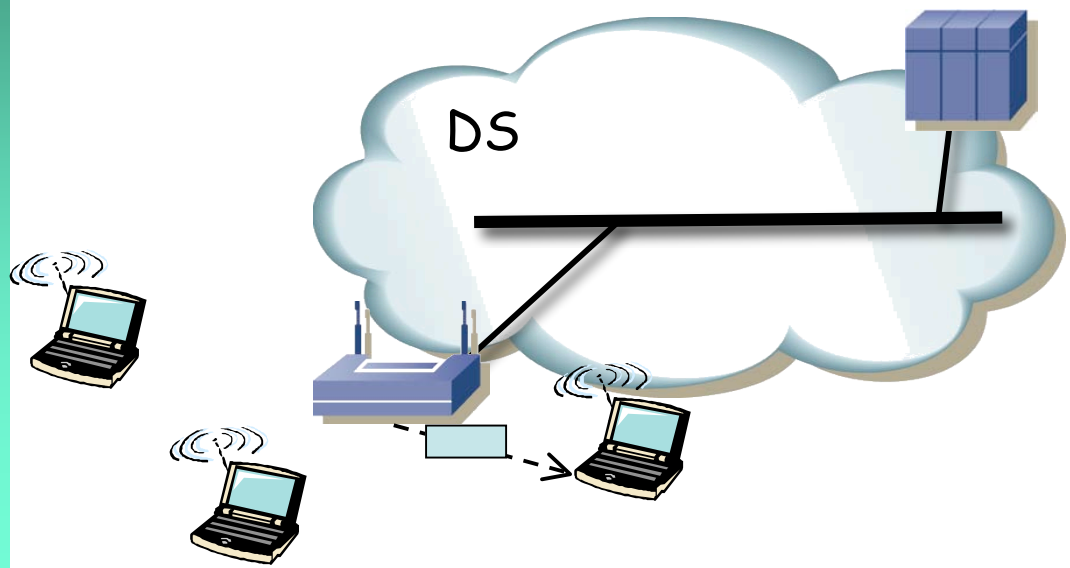
- Hacia el AP
  - Address 1 = BSSID
  - Address 2 = Dirección origen (MAC estación origen)
  - Address 3 = Dirección destino (MAC estación destino)
  - Address 4 = No usada



Direcciones

BSS

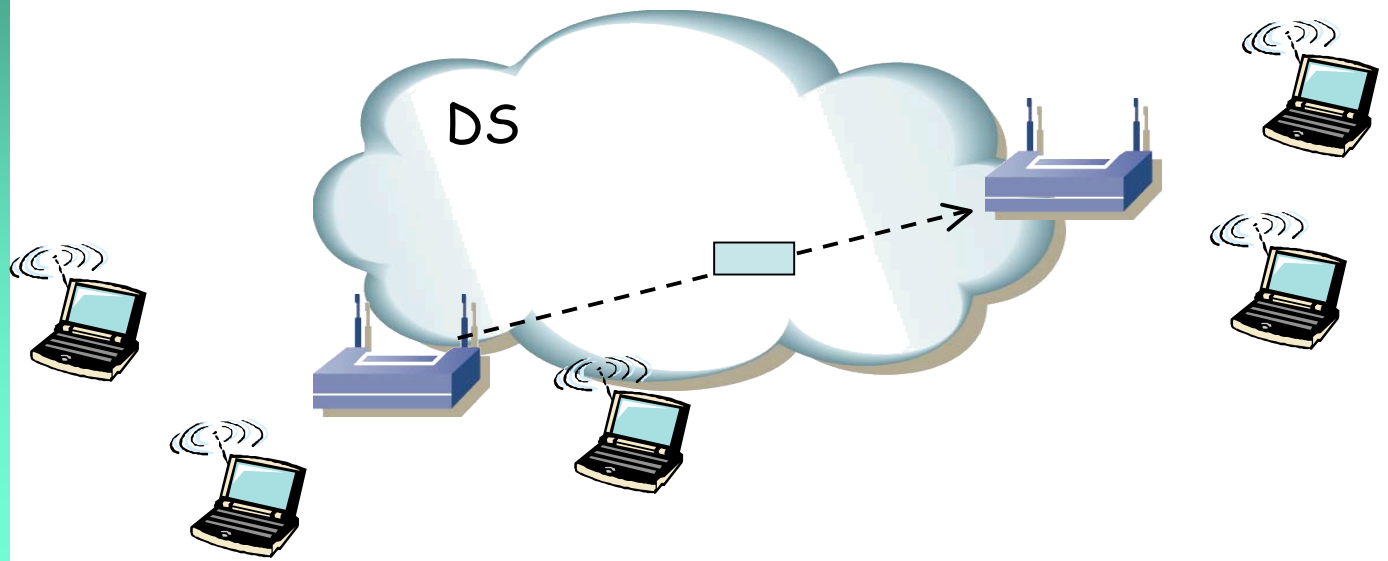
- Desde el AP
  - Address 1 = Dirección destino (MAC estación destino)
  - Address 2 = BSSID
  - Address 3 = Dirección origen (MAC estación origen)
  - Address 4 = No usada



Direcciones

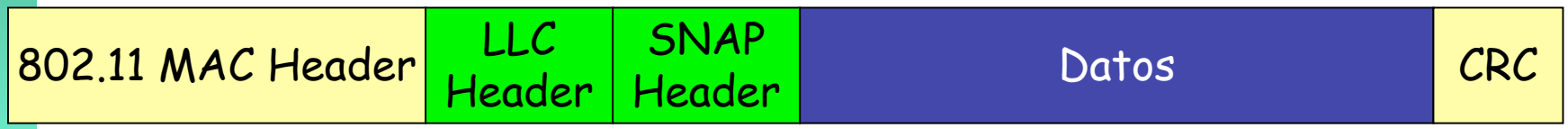
BSS

- WDS
  - Address 1 = MAC AP destino
  - Address 2 = MAC AP origen
  - Address 3 = Dirección destino (MAC estación destino)
  - Address 4 = Dirección origen (MAC estación origen)



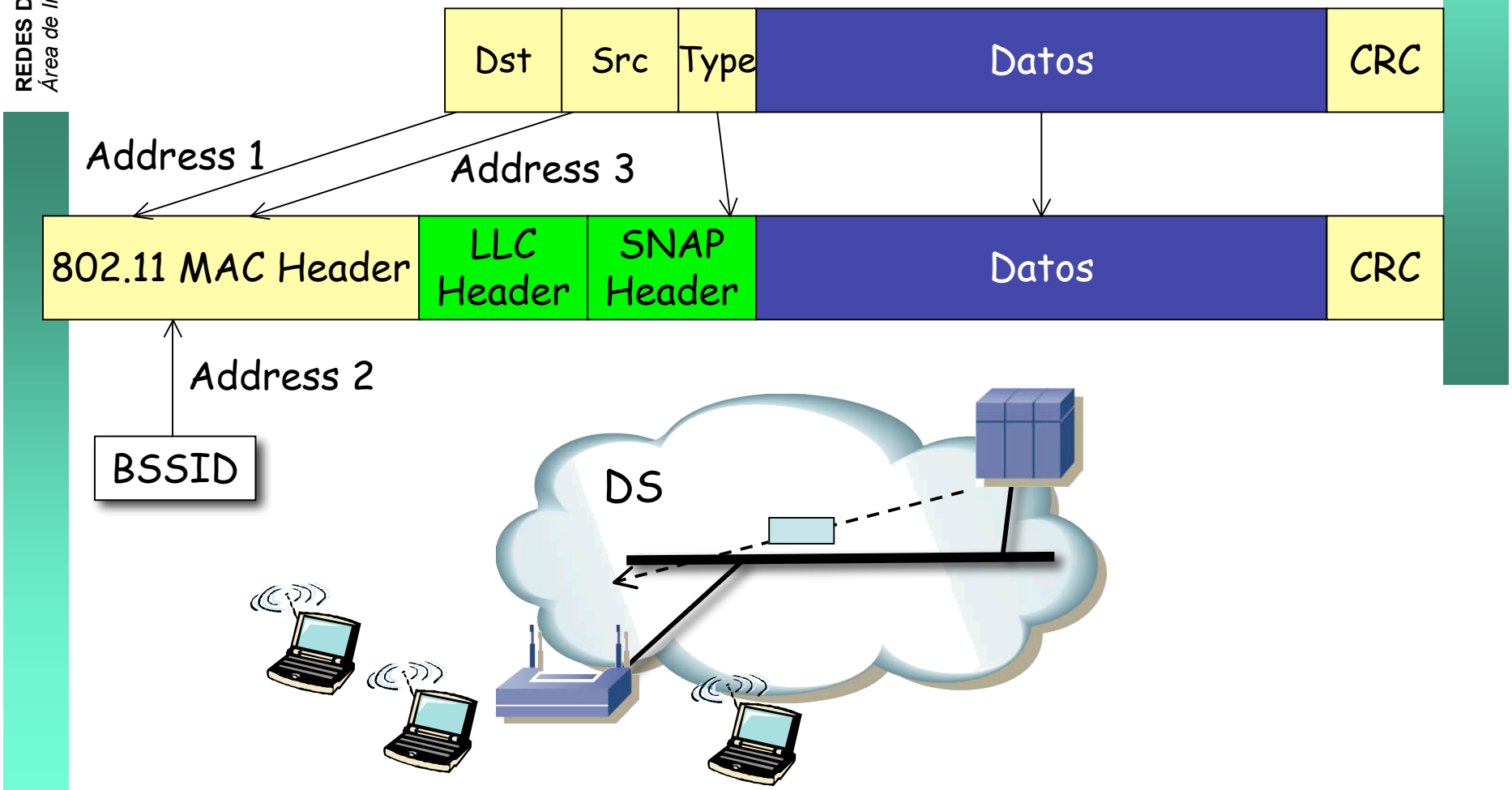
Encapsulado

- Emplea LLC/SNAP
- Para paquetes IP dos alternativas
  - RFC 1042
  - IEEE 802.1H



DS Ethernet

- Bridge DS → BSS

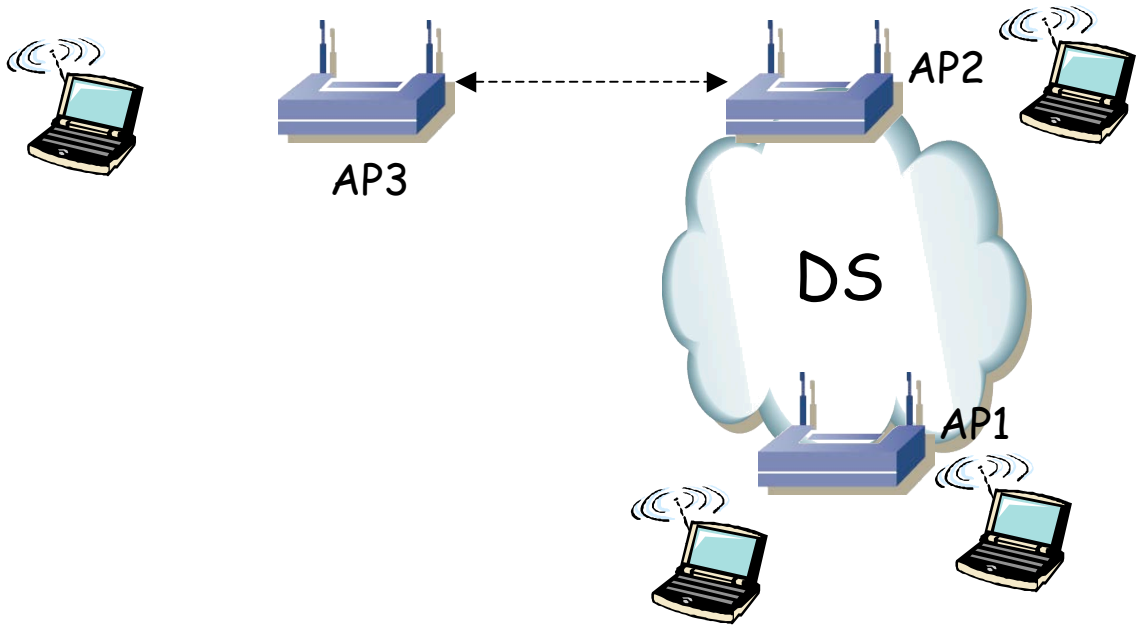


PCF

- *Point Coordination Function*
- Opcional
- Ofrece entrega de tramas sin contienda
- Solo para caso infraestructura (BSS)
- No implementada por la mayoría de los productos
- Funcionamiento:
  - En ciertos momentos comienza un *Contention Free Period (CFP)*
  - Marca el comienzo del CFP antes que una estación transmita con DCF porque emplea un tiempo menor (PIFS) de espera
  - El AP actuará enviando a las estaciones o solicitando tramas de ellas (*polling*)

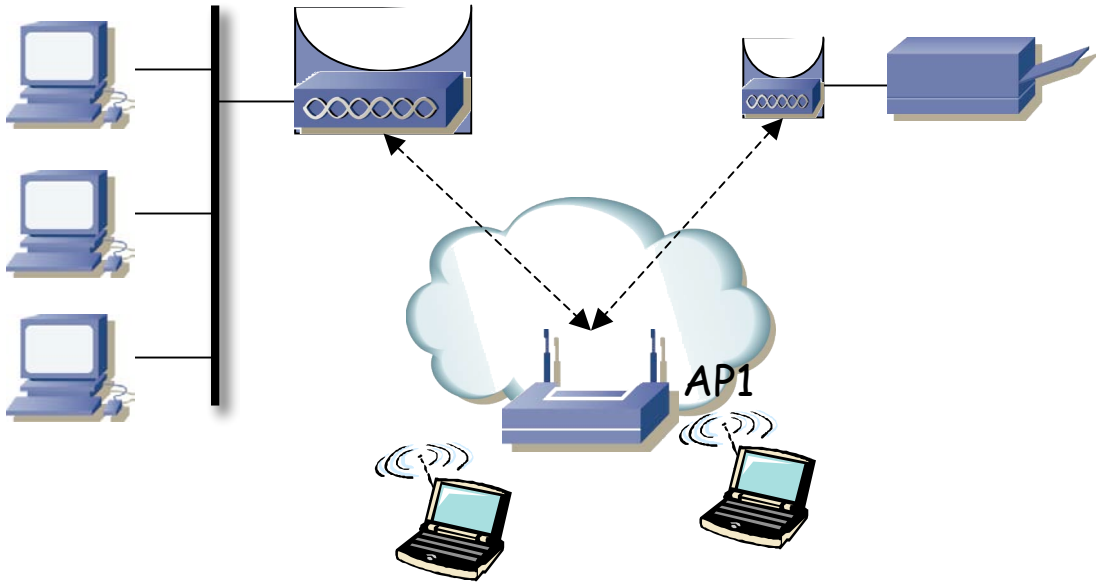
Repeater AP

- AP que no puede conectarse al DS cableado
- Usuarios muy alejados llegan a AP3 pero no a AP2
- AP3 retransmite las tramas en el mismo canal
- Extiende el BSS y el dominio de colisión



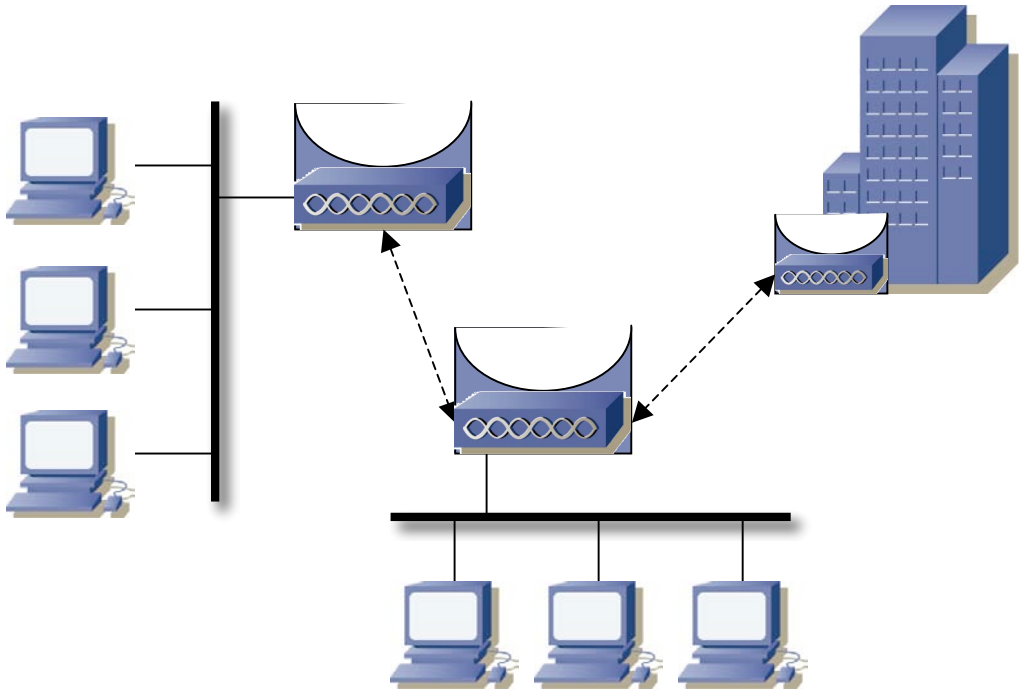
Universal client / Workgroup bridge

- Incluir en la red inalámbrica dispositivos con interfaz alámbrico
- Alejados del DS
- *Universal Client*: Cuando se conecta un solo dispositivo
- *Workgroup Bridge*: Se conecta una pequeña red cableada



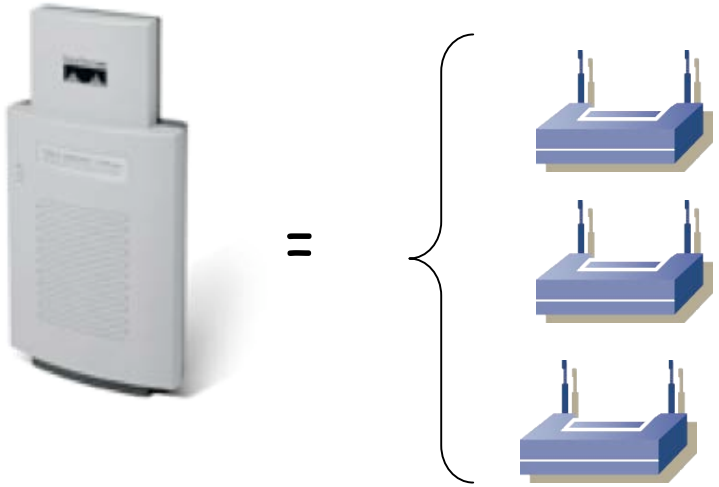
Wireless Bridge

- Interconectar LANs mediante puentes
- Enlace entre los puentes es inalámbrico
- Generalmente redes grandes y distancias mayores de las habituales para WLAN
- Uno de los puentes actúa como AP y los otros como clientes



Multi-BSS APs

- Circuitos integrados para 802.11 originalmente soportaba un solo BSS
- Hoy en día son crapaces de gestionar más de uno, con diferente SSID
- *Virtual Access Points*



Equipos Wi-Fi

Equipos Wi-Fi

- 802.11g Access Point
- Wireless PCMCIA interface card
- Multi-BSS Access Point
- Wireless Router
- Dualband Access Point
- Wireless Range Extender
- Wireless Print Server

Equipos Wi-Fi

- **802.11g Access Point**
- Wireless PCMCIA interface card
- Multi-BSS Access Point
- Wireless Router
- Dualband Access Point
- Wireless Range Extender
- Wireless Print Server

D-Link DWL-2100AP

D-Link DWL-2100AP

D-Link, the industry pioneer in wireless networking, introduces a performance breakthrough in wireless connectivity – **D-Link *Air*Plus *Xtreme G*™** series of high-speed devices now capable of delivering transfer rates up to 15x faster than the standard 802.11b with the new D-Link 108G. With the new *Air*Plus *Xtreme G* DWL-2100AP Wireless Access Point, D-Link sets a new standard for wireless access points.

With the D-Link 108G enhancement, the DWL-2100AP can achieve wireless speeds up to 15x in a pure D-Link 108G environment through the use of new wireless technologies such as Packet Bursting, Fast Frame, Compression & Encryption, and Turbo mode.These technologies enable a throughput high enough to handle video/audio streaming and future bandwidth-intense applications. The DWL-2100AP also supports SNMP v.3 for better network management with the provided Wireless AP Manager software that manages network configuration and firmware upgrades. For Enterprise networks, the DWL-2100AP supports network administration and real-time network traffic monitoring via D-Link's D-View Network Management software.

The DWL-2100AP features WDS (Wireless Distribution System) that can be configured to perform in any one of five modes: a Wireless Access Point, a Point-to-Point (PtP) bridge with another DWL-2100AP, a Point-to-Multipoint (PtMP) bridge, a Repeater for range extension, or as a Wireless Client. The WDS feature makes the DWL-2100AP an ideal solution for quickly creating and extending a wireless local area network (WLAN) in offices or other workplaces, or even at hotspots.

Wireless security is addressed as the DWL-2100AP uses WPA (Wi-Fi Protected Access) and 802.1X authentication to provide a higher level of security for data communication amongst wireless clients. The DWL-2100AP is also fully compatible with the IEEE 802.11b and 802.11g standards. With great manageability, versatile operation modes, solid security enhancement, the cost-effective D-Link *Air*Plus *Xtreme G* DWL-2100AP Wireless Access Point provides the ultra-fast wireless signal rates and everything else a network professional dreams of.

D-Link DWL-2100AP

Standards
- IEEE 802.11g
- IEEE 802.11b
- IEEE 802.11
- IEEE 802.3
- IEEE 802.3u

Device Management
- Web-Based – Internet Explorer v6 or later; Netscape Navigator v6 or later; or other Java- enabled browsers.
- SNMP v.3

Wireless Distribution System
- AP Client
- PtP Bridge
- PtMP Bridge
- Repeater

Security
- 64-, 128 152-bit WEP
- 802.1X (EAP-MD5, EAP-TLS, EAP-TTLS and EAP-PEAP)
- WPA —Wi-Fi Protected Access
- MAC Address Access Control (WPA-TKIP and WPA-AES)

Media Access Control
CSMA/CA with ACK

Wireless Frequency Range
2.4GHz to 2.4835GHz

Wireless Operating Range[2]
Indoors: Up to 328 ft (100 meters)
Outdoors: Up to 1312 ft (400 meters)

Modulation Technology
- Orthogonal Frequency Division Multiplexing (OFDM)
- Complementary Code Keying (CCK)
- DQPSK
- DBPSK

Wireless Transmit Power
15dBm (32mW) ± 2dB
(Control TX power level from full, 50%, 25%, 125% and min.)

Receiver Sensitivity
- 54Mbps OFDM, 10% PER,-66dBm)
- 48Mbps OFDM, 10% PER,-71dBm)
- 36Mbps OFDM, 10% PER,-76dBm)
- 24Mbps OFDM, 10% PER,-80dBm)
- 18Mbps OFDM, 10% PER,-83dBm)
- 12Mbps OFDM, 10% PER,-85dBm)
- 11Mbps CCK, 8% PER,-83dBm)
- 9Mbps OFDM, 10% PER,-86dBm)
- 6Mbps OFDM, 10% PER,-87dBm)
- 2Mbps QPSK, 8% PER,-89dBm)

External Antenna Type
1.0dB Dipole with reverse SMA connector

LEDs
- Power
- LAN (10/100)
- WLAN (Wireless Connection)

Temperature
- Operating: 32°F to 140°F (0°C to 40°C)
- Storing: 4°F to 149°F (-20°C to 65°C)

Humidity
95% maximum (non-condensing)

Power Input
Ext. Power Supply DC 5V, 2.0A

Safety & Emissions
• FCC • UL • VCCI • CSA • EN

Dimensions
- L = 5.6 inches (142mm)
- W = 4.3 inches (109mm)
- H = 1.2 inches (31mm)

Weight
0.44 lbs (200g)

Warranty
3 Year

[1] Maximum wireless signal rate derived from IEEE Standard 802.11g specifications. Actual data throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead lower actual data throughput rate.
[2] Environmental conditions may adversely affect wireless signal range.

Equipos Wi-Fi

- 802.11g Access Point
- **Wireless PCMCIA interface card**
- Multi-BSS Access Point
- Wireless Router
- Dualband Access Point
- Wireless Range Extender
- Wireless Print Server

D-Link Wireless PCMCIA card

802.11g Wireless LAN CardBus Adapter

The D-Link AirPlusXtremeG™ DWL-G650 Wireless Cardbus Adapter is an enhanced 802.11g high-performance, wireless adapter for notebook computers. This adapter supports high-speed wireless networking of up to 108Mbps Turbo mode, while providing seamless interoperability with all existing 802.11b wireless equipment. Together with better security, this adapter is the ideal wireless solution that offers an upgrade to a fast, new technology while protecting your past investments through interoperability with your current network equipment.

Up to 108Mbps Transmission Speed

Unlike most wireless cards, the DWL-G650 provides speeds of up to 108Mbps Turbo mode when used with other D-Link AirPlusXtremeG products. This compares favorably with 802.11b adapters that offer 11Mbps speed. The DWL-G650 provides all these using a single 2.4GHz wireless frequency, eliminating the complexity of dualband networking.

This enhanced speed and adoption of 2.4GHz frequency, now available for public use in most countries, plus the mobility and convenience inherent in a wireless LAN, make this adapter an ideal solution for bandwidth intensive WLAN applications.

Compatible With 802.11b

AirPlusExtremeG 802.11g compability with existing wireless LAN standards means that you do not need to change your entire network to maintain connectivity.

Easy Migration to Higher Bandwidth

By maintaining compatibility with your existing wireless network equipment, this adapter lets you upgrade to a higher speed at the pace you want. The DWL-G650 and other 802.11g standard devices can be gradually added to your network, while the rest of your older network remains perfectly connected.

Powerful Performance

To take full advantage of the new 108Mbps network bandwidth, this adapter uses 32-bit high-speed CardBus design to transfer network data with the computer host. This ensures that no bottlenecks take place between your computer's CPU and your network wireless frequency.

Advanced Security

In addition to offering faster data transfer speeds, this adapter also provides the newest, strongest, most advanced security features available today. For home users that do not incorporate a radius server in their networks, security is provided in a convenient, automatic way (when used in conjunction with other 802.11g products). No longer will you have to frequently input a new WEP key to execute security operations. With the DWL-G650, you will automatically receive a new key every time you connect, doing away with the inconvenience of manual WEP key input.

Easy Installation

With hot swap and plug-and-play capabilities, this adapter can be easily installed into a notebook PC for direct connection to any wireless device in the ad-hoc mode or infra-structure mode. Access to your wired Ethernet servers is also provided through your wireless LAN access points.

D-Link Wireless PCMCIA card

System Requirements
- 32-bit CardBus slot
- 300MHz processor and 32MB memory (minimum)

Standards
802.11g wireless LAN

Adapter Type
PC Card Type II CardBus

Media Access Control Protocol
CSMA/CA with ACK

Network Architecture Types
- Ad-Hoc mode
- Infrastructure mode

Frequency Range
2.4 - 2.4835 GHz

Operating Channels
- US (FCC): 11
- Europe (ETSI): 13
- Canada (D)C): 11

Network Transfer Rate/Modulation Technique
- 802.11b:
  11Mbps, 5.5Mbps: CCK
  2Mbps: DQPSK
  1Mbps: DBPSK
- 802.11g:
  54Mbps, 48Mbps, 36Mbps, 24Mbps, 18Mbps, 12Mbps, 9Mbps, 6Mbps:
  OFDM (Othogonal Frequency Division Multiplexing)

Receive Sensitivity (for 802.11b)
- 1Mbps: -92dBm
- 2Mbps: -88dBm
- 5.5Mbps: -86dBm
- 11Mbps: -84dBm

Receive Sensitivity (for 802.11g)
- 6Mbps: -88dBm
- 9Mbps: -85dBm
- 12Mbps: -85dBm
- 18Mbps: -81dBm
- 24Mbps: -77dBm
- 36Mbps: -73dBm
- 48Mbps: -71dBm
- 54Mbps: -70dBm

Transmit Output Power (for 802.11b)
1Mbps, 2Mbps, 5.5Mbps, 11Mbps: 16dBm to 18dBm

Transmit Output Power (for 802.11g)
- 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps: 16dBm to 18dBm
- 36Mbps: 15dBm to 17dBm
- 48Mbps: 14dBm to 16dBm
- 54Mbps, 108Mbps: 13dBm to 15dBm

Antenna
Internal patch antenna supporting diversity

Operation Range
- Indoors: up to 100 meters (328 feet)*
- Outdoors: up to 400 meters (1,312 feet)*

** Environmental factors may adversely affect range*

Security
- 64/128/152-bit WEP data encryption
- WPA EAP, WPA PSK

Physical & Environmental

Diagnostic LEDs
- Link
- Activity

Operating Voltage
3.3V

D-Link Wireless PCMCIA card

Power Consumption
- Transmission: 500 mA (max.)
- Reception: 380 mA (max.)

Dimensions
118 (L) x 54 (W) x 7.4 (H) mm
(4.64 x 2.13 x 0.29 inches)

Operating Temperature
0°- 55°C (32° - 131°F)

Storage Temperature
-20° - 75°C (-4° - 167° F)

Humidity
Up to 95% non-condensing

Emission (EMI)
- FCC Class B
- CE Class B

OS Support
Windows 98SE, ME, 2000, XP

Equipos Wi-Fi

- 802.11g Access Point
- Wireless PCMCIA interface card
- **Multi-BSS Access Point**
- Wireless Router
- Dualband Access Point
- Wireless Range Extender
- Wireless Print Server

Cisco Aironet 1100 Series Access Point

Feature	Benefit
2.4 GHz 802.11g Radio, Configurable up to 100 mW	2.4 GHz WLAN solution that delivers data rates of up to 54 Mbps with backwards compatibility to legacy 802.11b equipment.
Management Frame Protection	• Provides strong cryptographic authentication of WLAN management frames and provides detection capabilities against publicly available Intrusion Detection System (IDS) tools. Management frame protection is effective against known attacks, as well as any future attacks that rely on the unprotected nature of the WLAN management frames.
Hardware-Assisted AES Encryption	Provides high security without performance degradation.
Quality of Service (QoS)	• Prioritizes traffic for different application requirements. • Improves user experience of voice and video.
Wi-Fi Multimedia (WMM)	• Subset of the IEEE 802.11e QoS draft standard, supporting QoS prioritized media access through the Enhanced Distributed Channel Access (EDCA) method. • Improves the user experience for audio, video, and voice applications over a Wi-Fi wireless connection
Multiple Basic Service Set Identifier (MBSSID)	Supports up to 8 BSSIDS for configuration flexibility when segmenting traffic.
Flexible Mounting Orientations	Supports installation for a wide range of locations, including walls, ceilings, desktops, and cubicle partitions.
Anti-Theft Security Slot and Security Hasp	• Supports standard security cables or padlocks (not included). • Locks can be single- or master-keyed for simplified inventory management.
Integrated Diversity Dipole Antennas	• Has compact antenna profile. • Provides spherical coverage pattern that is optimized for any orientation. • Improves reliability in high-multipath environments such as offices.
Auto-Channel Selection	Determines and selects least congested channel.
Supports Inline Power over Ethernet (see Figures 3, 4, 5)	• Eliminates need for local AC power. • Reduces cable clutter. • Enables deployment in remote locations.

Cisco Aironet 1100 Series Access Point

Figure 4. The Cisco Aironet 1100 Series Powered with Cisco Catalyst Switches for Power over Ethernet

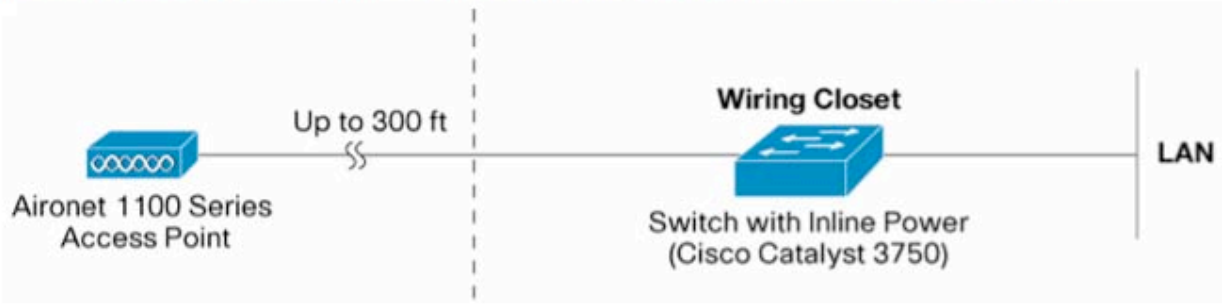
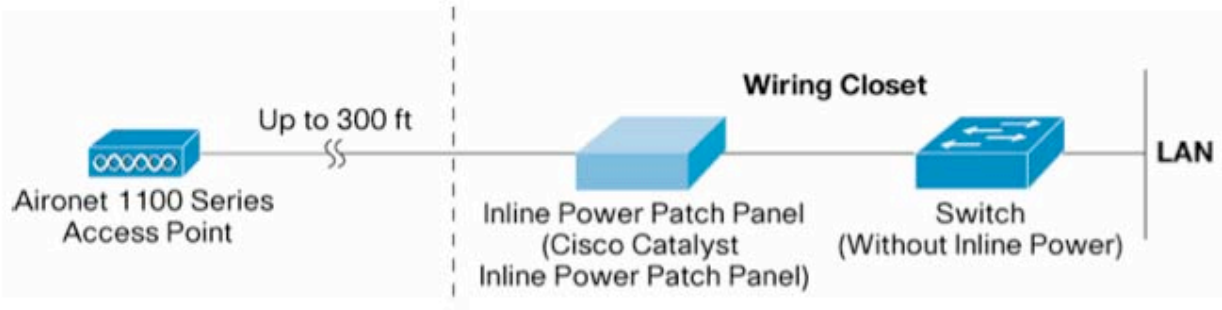


Figure 5. The Cisco Aironet 1100 Series Powered with a Cisco Catalyst Inline Power Patch Panel



Cisco Aironet 1100 Series Access Point

Software	• Cisco IOS Software Release 12.3(8)JA or later (autonomous). • Cisco IOS Software Release 12.3(11)JX or later (Lightweight Mode). • Cisco Unified Wireless Network Software Release 4.0 or later.
Data Rates Supported	802.11g: 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, and 54 Mbps
Network Standard	IEEE 802.11b or IEEE 802.11g
Uplink	Autosensing 802.3 10/100BaseT Ethernet

Cisco Aironet 1100 Series Access Point

Item	Specification
Frequency Band	802.11g: • 2.412 to 2.462 GHz (FCC) • 2.412 to 2.472 GHz (ETSI) • 2.412 to 2.484 GHz CCK: (TELEC) • 2.412 to 2.472 GHz Orthogonal Frequency Division Multiplexing (OFDM): (TELEC)
Network Architecture Type	Infrastructure, star topology
Wireless Medium	• 802.11g: OFDM • 802.11b and 802.11g: Direct sequence spread spectrum (DSSS)
Media Access Protocol	Carrier sense multiple access with collision avoidance (CSMA/CA)
Modulation	OFDM: • BPSK @ 6 and 9 Mbps • QPSK @ 12 and 18 Mbps • 16-QAM @ 24 and 36 Mbps • 64-QAM @ 48 and 54 Mbps DSS: • DBPSK @ 1 Mbps • DQPSK @ 2 Mbps • CCK @ 5.5 and 11 Mbps
Operating Channels	802.11g ETSI: 13; Americas: 11; TELEC (Japan): CCK-14, OFDM-13
Nonoverlapping Channels	Three

Cisco Aironet 1100 Series Access Point

Receive Sensitivity	802.11b: • 1 Mbps: -94 dBm • 2 Mbps: -91 dBm • 5.5 Mbps: -89 dBm • 11 Mbps: -85 dBm 802.11g: • 1 Mbps: -95 dBm • 2 Mbps: -91 dBm • 5.5 Mbps: -89 dBm • 6 Mbps: -90 dBm • 9 Mbps: -84 dBm • 11 Mbps: -88 dBm • 12 Mbps: -82 dBm • 18 Mbps: -80 dBm • 24 Mbps: -77 dBm • 36 Mbps: -73 dBm • 48 Mbps: -72 dBm • 54 Mbps: -72 dBm

Cisco Aironet 1100 Series Access Point

Item	Specification
Available Transmit Power Settings	802.11g: • CCK: – 100 mW (20 dBm) – 50 mW (17 dBm) – 30 mW (15 dBm) – 20 mW (13 dBm) – 10 mW (10 dBm) – 5 mW (7 dBm) – 1 mW (0 dBm) • OFDM: – 30 mW (15 dBm) – 20 mW (13 dBm) – 10 mW (10 dBm) – 5 mW (7 dBm) – 1 mW (0 dBm) Maximum power setting will vary according to individual country regulations.

Cisco Aironet 1100 Series Access Point

Range

Indoors: Distance across open office environment

- 90 ft (27 m) @ 54 Mbps
- 95 ft (29 m) @ 48 Mbps
- 100 ft (30 m) @ 36 Mbps
- 140 ft (42 m) @ 24 Mbps
- 180 ft (54 m) @ 18 Mbps
- 210 ft (64 m) @ 12 Mbps
- 220 ft (67 m) @ 11 Mbps
- 250 ft (76 m) @ 9 Mbps
- 300 ft (91 m) @ 6 Mbps
- 310 ft (94 m) @ 5.5 Mbps
- 350 ft (107 m) @ 2 Mbps
- 410 ft (125 m) @ 1 Mbps

Outdoors:

- 110 ft (34 m) @ 54 Mbps
- 200 ft (60 m) @ 48 Mbps
- 225 ft (69 m) @ 36 Mbps
- 325 ft (100 m) @ 24 Mbps
- 400 ft (122 m) @ 18 Mbps
- 475 ft (145 m) @ 12 Mbps
- 490 ft (150 m) @ 11 Mbps
- 550 ft (168 m) @ 9 Mbps
- 650 ft (198 m) @ 6 Mbps
- 660 ft (201 m) @ 5.5 Mbps
- 690 ft (210 m) @ 2 Mbps
- 700 ft (213 m) @ 1Mbps

Ranges and actual throughput vary based upon numerous environmental factors, so individual performance may differ.

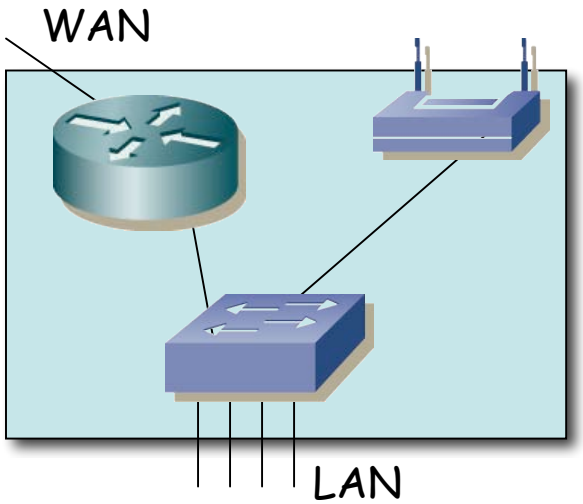
Equipos Wi-Fi

- 802.11g Access Point
- Wireless PCMCIA interface card
- Multi-BSS Access Point
- **Wireless Router**
- Dualband Access Point
- Wireless Range Extender
- Wireless Print Server

Linksys Wireless Router

The Linksys Wireless-G Broadband Router is really three devices in one box. First, there's the Wireless Access Point, which lets you connect both screaming fast Wireless-G (802.11g at 54Mbps) and Wireless-B (802.11b at 11Mbps) devices to the network. There's also a built-in 4-port full-duplex 10/100 Switch to connect your wired-Ethernet devices together. Connect four PCs directly, or attach more hubs and switches to create as big a network as you need. Finally, the Router function ties it all together and lets your whole network share a high-speed cable or DSL Internet connection.

Once your computers are connected to the Router and the Internet, they can communicate with each other too, sharing resources and files. All your computers can print on a shared printer connected anywhere in the house. And your computers can share all kinds of files -- music, digital pictures, and documents. Keep all your digital music on one computer, and listen to it anywhere in the house. Organize all of your family's digital pictures in one place, to simplify finding the ones you want, and easing backup to CD-R. Utilize extra free space on one computer when another's hard drive starts to fill up.



The new push button setup feature makes it easy to configure your wireless devices. Just push the button on the router and on your other SecureEasySetup-enabled wireless device to automatically create an encryption-secured wireless connection. Wi-Fi Protected Access™2 (WPA2) protects your data and privacy with up to 128-bit industrial-strength encryption. The Router can serve as a DHCP Server, has a powerful SPI firewall to protect your PCs against intruders and most known Internet attacks, supports VPN pass-through, and can be configured to filter internal users' access to the Internet. Advanced configuration is a snap with the web browser-based interface.

With the Linksys Wireless-G Broadband Router at the center of your home or office network, you can share a high-speed Internet connection, files, printers, and multi-player games with flexibility, speed,

Linksys Wireless Router

Features

- Complies with 802.11g and 802.11b (2.4GHz) Standards
- Unsurpassed Wireless Security with Wi-Fi Protected Access™ 2 (WPA2)
- Enhanced Internet Security Management Functions including Internet Access Policies with Time Schedules
- All LAN Ports Support Auto-Crossover (MDI/MDI-X) - No Need for Crossover Cables
- SecureEasySetup push button makes it easy to configure your wireless devices

Specifications

Model Number	WRT54G
Standards	IEEE 802.3, IEEE 802.3u, IEEE 802.11g, IEEE 802.11b
Channels	11 Channels (US, Canada) 13 Channels (Europe and Japan)
Ports/Buttons	Internet: One 10/100 RJ-45 Port LAN: Four 10/100 RJ-45 Switched Ports One Power Port One Reset Button One SES Button
Cabling Type	UTP CAT 5
LEDs	Power, DMZ, WLAN, LAN (1, 2, 3, 4), Internet
RF Power Output	18 dBm
UPnP able/cert	able
Security features	Stateful Packet Inspection (SPI) Firewall, Internet Policy
Wireless Security	Wi-Fi Protected Access™ 2 (WPA2), WEP, Wireless MAC Filtering

Minimum Requirements

- 200 MHz or faster processor
- 64 MB of RAM
- Internet Explorer 5.5 or Firefox 1.0 or Higher for Web-based configuration
- CD-ROM Drive
- Windows 98SE, Me, 2000, or XP
- Network Adapter

Package Contents

- Wireless-G Broadband Router
- Setup CD-ROM with Symantec Internet Security
- User Guide on CD-ROM
- Power Adapter
- Ethernet Network Cable
- Registration Card

Equipos Wi-Fi

- 802.11g Access Point
- Wireless PCMCIA interface card
- Multi-BSS Access Point
- Wireless Router
- **Dualband Access Point**
- Wireless Range Extender
- Wireless Print Server

D-Link DWL 8200AP

For Business-Class Environments
- Dualband Connectivity for Increased Network Capacity
- Concurrent Operation in both 802.11a and 802.11b/g at Full Bandwidth Speeds
- Two 5dBi High-Gain Dualband Antennas
- Ideal for Indoor Deployments
- Plenum-Rated Housing

Multiple Operation Modes
- Access Point
- WDS with AP
- WDS

High Performance Connectivity
- IEEE 802.11a/g Wireless
- Up to 54Mbps in Both Bands

Trusted Security Features
- 802.11i (WPA2)
- WPA – Personal
- WPA – Enterprise
- 802.1x User Authentication
- RADIUS Support
- AES
- MAC Address Filtering
- WEP

Convenient Installation
- Supports 802.3af Power over Ethernet
- Locking Brackets Included

Easy Management
- AP Manager
- Web Browser (HTTP)
- Telnet
- SNMP v3

AirPremier®

Managed Dualband Access Point

D-Link, an industry pioneer in wireless networking, introduces a solution for businesses seeking to deploy powerful and reliable Wireless LANs. D-Link unveils its new *Air*Premier DWL-8200AP 802.11a/g Managed Dualband Access Point, designed specifically for business-class environments such as large or enterprise corporations, to provide secure and manageable dualband wireless LAN options for network administrators.

The DWL-8200AP allows network administrators to deploy a highly manageable and extremely robust dualband wireless network. The two detachable high-gain dualband antennas provide optimal wireless coverage in both the 802.11a and 11g bands. Enclosed in a plenum metal chassis, the DWL-8200AP adheres to strict fire codes and ensures complete safety. For advanced installations, this new high-speed Access Point has an integrated 802.3af Power over Ethernet (PoE) support, allowing installation of this device in areas where power outlets are not readily available.

The DWL-8200AP delivers concurrent wireless performance with maximum wireless signal rates of up to 54Mbps[1] in both bands simultaneously. With dualband connectivity, two networks are created both running at full bandwidth speeds, offering a significant increase in total network capacity. At the same time, the DWL-8200AP remains fully backward compatible with the IEEE 802.11b standard in the 2.4GHz frequency.

Since wireless security remains a strong concern among businesses, the DWL-8200AP provides the latest wireless security technologies by supporting both Personal and Enterprise versions of WPA and WPA2 (also known as 802.11i) with RADIUS support to ensure complete network protection. Other security features included in this Access Point are MAC Address Filtering, Wireless LAN segmentation, Disable SSID Broadcast, and support for Advanced Encryption Standard (AES) Encryption.

D-Link DWL 8200AP

For additional network access security, if the DWL-8200AP is connected to a switch that supports VLAN tagging (802.1q), the VLAN enabled DWL-8200AP can appropriately provide internal and guest network access options. Based on VLAN tagging infrastructure, the DWL-8200AP also features Multiple SSID support to further help segment users on the network. The DWL-8200AP also includes a wireless client isolation mechanism, which limits direct client-to-client communication.

To maximize total return on investment, the DWL-8200AP can be configured to optimize network performance based on any one of its multiple operation modes. The DWL-8200AP supports Access Point, Wireless Distribution System (WDS) with Access Point, and WDS to provide network access to clients and/or to serve as the wireless network backbone. With WDS support, network administrators can set up multiple DWL-8200APs throughout the facility and configure them to bridge with one another on one band and provide network access on the other.

Network administrators can manage all the DWL-8200AP's settings via its web-based configuration utility or with Telnet. For advanced network management, administrators can use D-Link's AP Manager or D-View SNMP management module to configure and manage multiple access points from a single location. In addition to a streamlined management process, the AP Manager or D-View software provide network administrators with the means of verifying and conducting regular maintenance checks without wasting resources by sending personnel out to physically verify proper operation.

With integrated dualband functionality, PoE support, extensive manageability, versatile operation modes, and solid security enhancements, the new D-Link *Air*Premier DWL-8200AP Managed Dualband Access Point provides SMB environments with a business-class solution for deploying a wireless network in the workplace.

D-Link DWL 8200AP

Specifications

Standards
- IEEE 802.11a
- IEEE 802.11b
- IEEE 802.11g
- IEEE 802.3
- IEEE 802.3af
- IEEE 802.3u
- IEEE 802.3x

Device Management
- Web-Based – Internet Explorer v6 or later; Netscape Navigator v7 or later; or other Java-enabled browsers.
- Telnet
- AP Manager
- SNMP v.3

Data Rate[2]
For 802.11a/g:
- 108, 54, 48, 36, 24, 18, 12, 9 and 6Mbps

For 802.11b:
- 11, 5.5, 2, and 1Mbps

Security
- WPA – Enterprise
- WPA – Personal
- WPA2 – Enterprise
- 64-, 128-, 152-bit WEP
- MAC Address Access Control List

Wireless Frequency Range
- 2.4GHz to 2.4835GHz
- 5.15GHz to 5.35GHz and 5.725GHz to 5.825GHz

Radio and Modulation Type
For 802.11b:
DSSS:
- DBPSK @ 1Mbps
- DQPSK @ 2Mbps
- CCK @ 5.5 and 11Mbps

For 802.11a/g:
OFDM:
- BPSK @ 6 and 9Mbps
- QPSK @ 12 and 18Mbps
- 16QAM @ 24 and 36Mbps
- 64QAM @ 48, 54 and 108Mbps

DSSS:
- DBPSK @ 1Mbps
- DQPSK @ 2Mbps
- CCK @ 5.5 and 11Mbps

Wireless Operating Range[3]
802.11g (Full Power with 5dBi gain diversity dipole antenna)
Indoors:
- 98ft (30m) @ 54Mbps
- 203ft (62m) @ 18Mbps
- 105ft (32m) @ 48Mbps
- 223ft (68m) @ 12Mbps
- 121ft (37m) @ 36Mbps
- 253ft (77m) @ 9Mbps
- 148ft (45m) @ 24Mbps
- 302ft (92m) @ 6Mbps

Outdoors:
- 328ft (100m) @ 54Mbps
- 1378ft (420m) @ 6Mbps
- 968ft (295m) @ 11Mbps

LEDs
- Power
- Status
- LAN 1
- LAN 2
- 802.11b/g
- 802.11a

Operating Voltage
- 48VDC +/- 10% for PoE

Temperature
- Operating: 32°F to 104°F (0°C to 40°C)
- Storing: -4°F to 149°F (-20°C to 65°C)

Humidity
- Operating: 10%~90% (non-condensing)
- Storing: 5%~95% (non-condensing)

Certifications
- FCC
- Wi-Fi

Dimensions
- L = 10.93 inches (277.7mm)
- W = 6.10 inches (155mm)
- H = 1.77 inches (45mm)

Warranty
- 1-Year

Equipos Wi-Fi

- 802.11g Access Point
- Wireless PCMCIA interface card
- Multi-BSS Access Point
- Wireless Router
- Dualband Access Point
- **Wireless Range Extender**
- Wireless Print Server

D-Link Wireless G Range Extender

The D-Link AirPlus G DWL-G710 Wireless Range Extender functions as a repeater that increases the wireless signal range in large homes and buildings. This device takes an existing 802.11g wireless signal and repeats it to enable wireless connectivity in the basement, patio, garage or any "dead spot" areas where your original wireless signal could not reach. Transmitting data at up to 54Mbps speed, this device is an ideal way to extend the reach of your wireless network

Operation Range Extension. Repeater signals are provided when the DWL-G710 is deployed in conjunction with a wireless router or access point. It can receive signals from router or access point up to 100 meters away, then re-broadcasts the signals to wireless clients beyond the edge of the original network. Range extension of up to 50% of the original network on a 2.4GHz frequency band.

802.11g Wireless Standard. Complying to the 802.11g WLAN standard, the DWL-G710 provides speeds of up to 54Mbps and is an ideal solution for bandwidth intensive wireless applications at home and office. It is also backward compatible with 802.11b standard wireless devices, providing seamless interoperability with the earlier standard equipment. By maintaining compatibility with your existing wireless network equipment, this device lets you upgrade to a higher speed while protecting your past investments in networking.

Network Security. The DWL-G710 provides standard WEP 64/128-bit data encryption and supports WPA-PSK and WPA2-PSK for enhanced wireless security.

Simple Setup. A web-based Wizard allows you to set up the device and apply security settings for the device. After a quick configuration, you can place this range extender in close proximity of your wireless router or access point and begin offering a reliable connection to the rest of your home or office.

D-Link Wireless G Range Extender

Product Specifications

Network Standards
- 802.11g wireless LAN
- 802.11b wireless LAN
- 802.3/802.3u 10BASE-T/100BASE-TX Ethernet

Media Access Control Protocol
CSMA/CA with ACK

Network Architecture Type
Infra-structure mode

Operating Frequency
2.4 to 2.4835 GHz ISM band

Operating Channels
- FCC: 11
- ETSI: 13

Radio and Modulation Schemes
DQPSK, DBPSK, CCK, OFDM

Receive Sensitivity (for 802.11b)
(at 8% PER)
- -82dBm at 11Mbps
- -85dBm at 5.5Mbps
- -87dBm at 2Mbps
- -87dBm at 1Mbps

Receive Sensitivity (for 802.11g)
(at 10% PER)
- -82dBm at 6Mbps
- -81dBm at 9Mbps
- -79dBm at 12Mbps
- -77dBm at 18Mbps
- -74dBm at 24Mbps
- -70dBm at 36Mbps
- -66dBm at 48Mbps
- -65dBm at 54Mbps

Wireless Transmit Power
Typical RF Output Power at each Data Rate
For 802.11g:
- 31mW (15dBm) @ 54Mbps
- 40mW (16dBm) @ 48Mbps
- 40mW (16dBm) @ 36, 24, 18, 12, 9, and 6Mbps

For 802.11b:
- 50mW (17dBm) @ 11, 5.5, 2, and 1Mbps

Security
- 64/128-bit WEP data encryption
- WPA-PSK
- WPA2-PSK

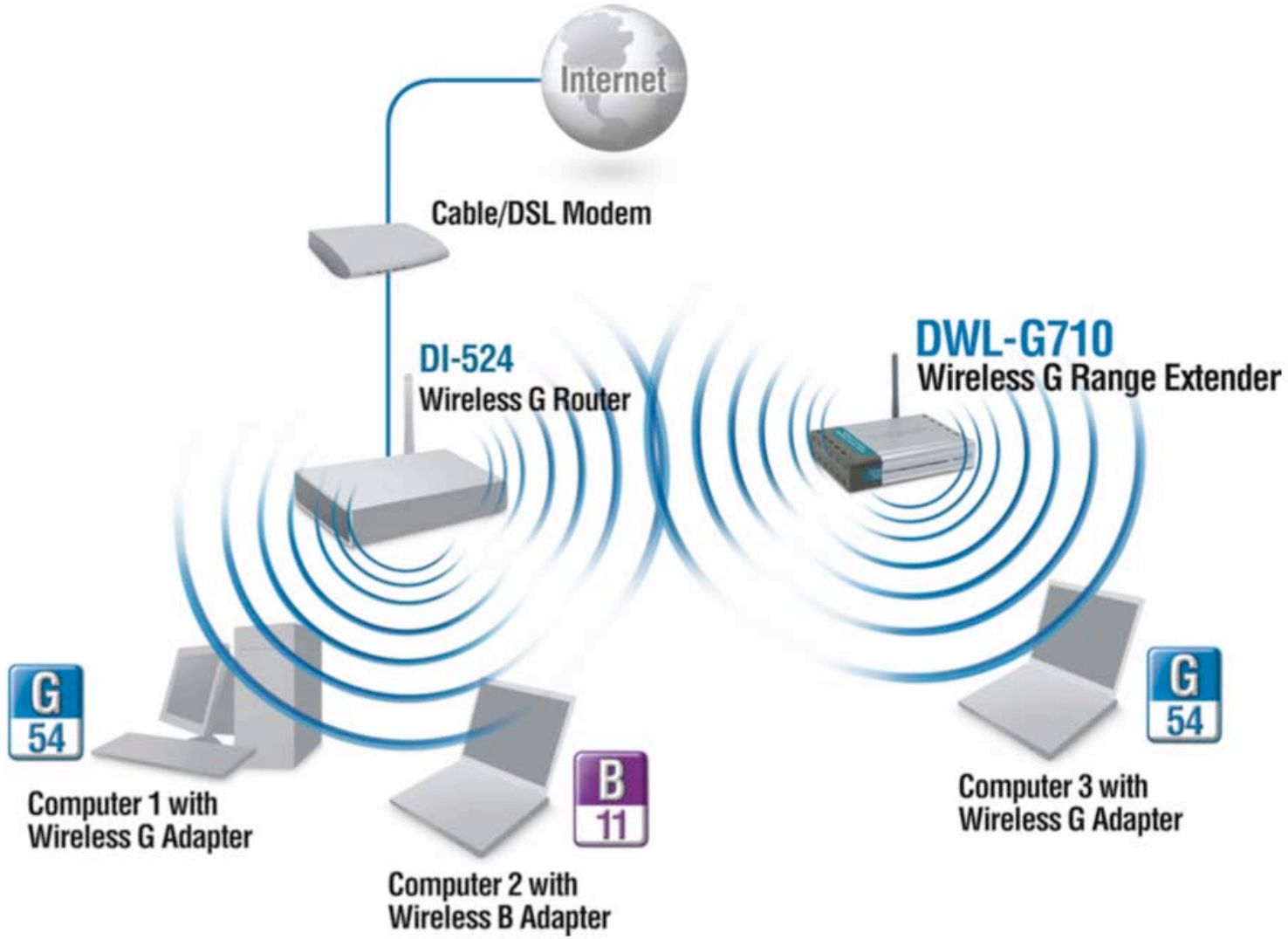
Antenna
2dBi Gain detachable external omni-directional dipole antenna with RP-SMA connector

Operation Range
- Indoors: up to 100 meters *
- Outdoors: up to 300 meters *

** Environmental factors may adversely affect range*

Device Management
Web-based management through Internet Explorer v.6 or later, Netscape Navigator v.7 or later or other Java-enabled browser

D-Link Wireless G Range Extender



Equipos Wi-Fi

- 802.11g Access Point
- Wireless PCMCIA interface card
- Multi-BSS Access Point
- Wireless Router
- Dualband Access Point
- Wireless Range Extender
- **Wireless Print Server**

Linksys Wireless Ethernet Bridge

The versatile Wireless-G Ethernet Bridge can make any wired Ethernet-equipped device a part of your wireless network. At home, use the Bridge to connect game consoles, set-top boxes, or computers to your Wireless-G network and its shared high-speed Internet connection. In the office, convert your Ethernet-wired printer, camera, notebook or desktop into a wireless networked device.

It's completely driver-free, so it works on any platform and under any operating system! Since there's no drivers to load, setup is a snap -- configure the network settings through your PC's web browser, then plug it into your device and go. And physical installation is simplified by support for Power Over Ethernet. With an optional POE Adapter, you can mount the Bridge wherever you want -- power and data are both supplied through the Category 5 Ethernet cable.

You can also use the Wireless-G Ethernet Bridge as a kind of "cable-less cable" to connect remote areas together. Maybe Shipping is all the way across the warehouse from Receiving. Or maybe you want to set up a home office in your detached garage. With a Wireless-G Ethernet Bridge in the garage, and another one (or a Wireless-G Access Point) in the house, you're connected -- no digging trenches, and no overhead wires.

To protect your data and privacy, all wireless transmissions can be encrypted with industrial-strength Wi-Fi Protected Access (WPA) security. Let the Wireless-G Ethernet Bridge from Linksys open up exciting new possibilities for your wireless network.

- Converts wired Ethernet devices to Wireless-G (802.11g) network connectivity
- Works without drivers on Windows®, Macintosh®, Linux®, PlayStation®2, Xbox™, or proprietary devices—anything with an Ethernet port!
- Provides high-speed cable-free bridging between remote workgroups
- Supports Power over Ethernet for ease of installation (PoE Adapter required)

Linksys Wireless Ethernet Bridge

Specifications

Model Number	WET54G v3
Standards	IEEE 802.11g, IEEE 802.11b, IEEE 802.3, IEEE 802.3u
Ports	One 10/100 Auto-Crossover (MDI/MDI-X) Port, Power Port
Buttons	Reset Button
Cabling Type	Category 5 or better
LEDs	Power, Ethernet, Wireless
Transmit Power	16 ± 1 dBm @ 11Mbps CCK, 12 ± 1 dBm @ 54Mbps OFDM
Security Feature	WPA, WEP Encryption
WEP Key Bits	64/128-bit
Protocols	802.11b: CCK (11Mbps), CCK (5.5Mbps), DQPSK (2Mbps), DBPSK (1Mbps) 802.11g: OFDM (54Mbps)

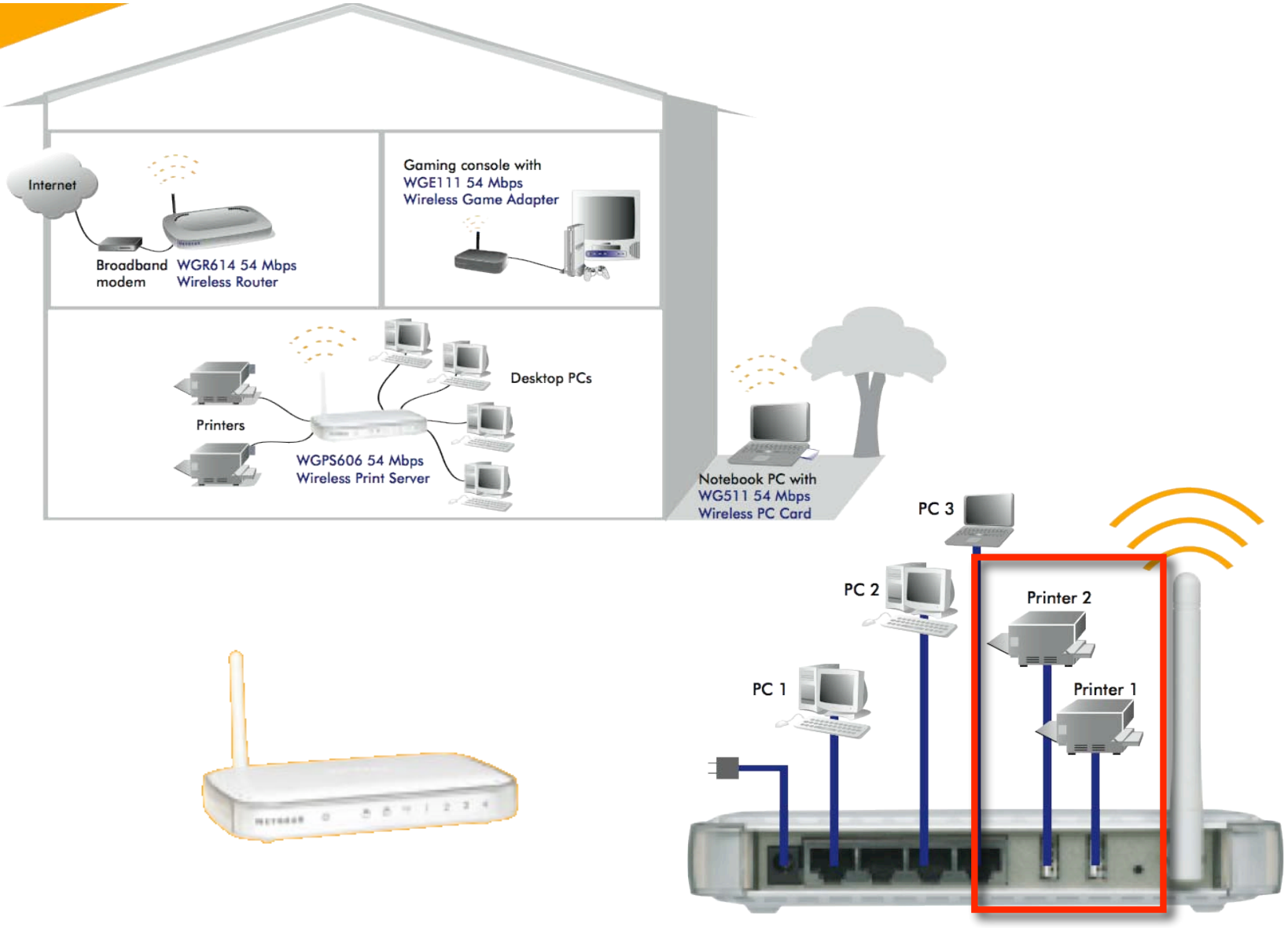
Features

- Operates in the 2.4GHz frequency spectrum with throughput of up to 54Mbps
- Complies with IEEE 802.11g standard, and backwards compatible with IEEE 802.11b products
- Supports WPA Security, 64/128-bit WEP Encryption
- Installs in minutes with easy-to-use Setup Wizard
- Built-in web user interface for easy configuration from any web browser
- Security of up to 128-bit WEP encryption
- Supports Power over Ethernet for easy deployment
- Equipped with one 10/100 auto-crossover (MDI/MDI-X) port

Equipos Wi-Fi

- 802.11g Access Point
- Wireless PCMCIA interface card
- Multi-BSS Access Point
- Wireless Router
- Dualband Access Point
- Wireless Range Extender
- Wireless Print Server

Netgear Wireless Print Server



Netgear Wireless Print Server

- *Help is there when you need it! NETGEAR provides 24x7 technical support* in English, with selected local language support during office hours.*

Wireless printing for four or more users!

Would you and the other users in your network like the freedom to print wirelessly? And, to connect to more than one printer, without having to add print servers, wireless adapters, or unsightly Ethernet cables? With NETGEAR's 54 Mbps Wireless Print Server with 4-Port Switch, now you can! In seconds, you can connect two printers and four PCs to your wireless network – all with one simple device. NETGEAR's 54 Mbps Wireless Print Server has two USB ports, as well as a wireless Ethernet bridge mode with a 4-port switch. That means you can connect your computer to your high-end color printer for your business use, and send the kids' documents to your older Inkjet printer – all without wires! Best of all, more than four users can use the printer, without adding any additional wireless adapters.

Wireless You can place your printers anywhere in your home or office that works best for you, and share access to them via your wireless network. You'll get the most out of both printers, and you won't have to buy two separate print servers.

Secure NETGEAR's 54 Mbps Wireless Print Server employs powerful WEP Encryption and WPA-PSK to keep your wireless network secure. In addition, it's fully interoperable with 802.11b, 802.11g, and RangeMax™ (MIMO-G) networks.

Best Value Do you have multiple users in your network? No problem. You can connect up to four PCs to your wireless network, without adding any new adapters. The Wireless Ethernet Bridge function in NETGEAR's 54 Mbps Wireless Print Server makes it possible to connect a cluster of computers, easily and cost-effectively. And with the sleek, stand-up case and small footprint of the Wireless Print Server, you'll save space in your home or office.

Sets Up in Seconds Are you the entire tech-support department for your network? Then you'll be glad to know that your NETGEAR 54 Mbps Wireless Print Server installs in seconds, thanks to the new Smart Wizard Configuration Assistant. Smart Wizard automatically detects and configures your print server, providing simple-to-understand prompts to guide you through the process. It's fast, easy, and completely hassle-free.

Netgear Wireless Print Server

Product Specifications

- **Printer Connection:**
  - USB 1.1 (compatible with USB 2.0)
- **Network Connection:**
  - 4-Port Switched Ethernet 10/100 autosensing RJ-45 ports
- **Radio Data Rate:**
  - 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, & 54 Mbps (auto rate capable)
- **Printing Methods:**
  - Peer-to-Peer (PTP), Windows LPD printing
- **Electromagnetic Compliance:**
  - FCC Part 15 Sub Class B and C
- **Environmental Specifications:**
  - Operating temperature: 0 to 40° C (32 to 104° F)
- **Wireless:**
  - Modulation Type:
    OFDM with BPSK, QPSK, 16QAM, 64QAM, DBPSK, DQPSK, CCK
  - Frequency:
    2.412 - 2.462 GHz (US)
    2.412 - 2.472 GHz (Europe ETSI)
    2.412 - 2.472 GHz (Spain)
    2.457 - 2.472 GHz (France)
- **Encryption:**
  - 40-bit (also called 64-bit), 128-bit WEP encryption
  - WPA-PSK
- **Physical Specifications:**
  - Dimensions: 28 x 175 x 119 mm (1.1 x 6.9 x 4.7 in)
  - Weight: 0.27 kg (0.6 lb)
- **Warranty:**
  - NETGEAR 1-year warranty

System Requirements

- Pentium® Class PC
- Windows® 98SE, Me, 2000, XP

Package Contents

- WGPS606 54 Mbps Wireless Print Server w/4-port Switch
- Power Adapter
- 2 USB cables
- Resource CD
- Installation Guide
- Warrany/Support information card

NETGEAR Related Products

- WPN824 RangeMax™ Wireless Router
- WGU624 Double 108 Mbps Wireless Firewall Router
- WGT624 108 Mbps Wireless Firewall Router
- WGR614 54 Mbps Wireless Router