

Velocidades del Troubleshooting 802.11n

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Introducción

Este documento aborda problemas frecuentes a tener en cuenta en el troubleshooting de la producción inalámbrica. Este documento incluye el uso de las herramientas para medir el funcionamiento y la producción de la red inalámbrica, que incluye diverso (APS) de los Puntos de acceso del vendedor 802.11n en comparación con Cisco 1252 AP bajo condiciones de prueba similares.

prerrequisitos

Requisitos

Cisco recomienda que usted tiene estos requisitos:

- Herramientas tales como iPerf, y analizadores de red tales como OmniPeek y análisis de espectro de Cisco
- 802.11n soportó 1140, 1250, 3500, y las 1260 Series AP

Componentes Utilizados

La información que contiene este documento se basa en las siguientes versiones de software y hardware.

- Versión de software corriente 6.0.182 del regulador de WS-SVC-WISM
- AIR-LAP1142-A-K9 AP

Convenciones

Consulte [Convenciones de Consejos TécnicosCisco](#) para obtener más información sobre las convenciones del documento.

Antecedentes

802.11n es nacido debido a varios cambios realizados en la agregación del capítulo AP: A-MPDU y A-MSDU.

- Tamaño Ack del bloque
- MCS y vinculación del canal
- MIMO
- Usando 5GHz sobre 2.4 gigahertz: también el Wi-Fi de la mención certifica la vinculación del canal en 5GHz

Resuelva problemas el regulador para las velocidades 11n

Complete estos pasos:

1. Verifique que el soporte 802.11n esté habilitado en el regulador.

```
(WiSM-slot3-2) >show 802.11a
802.11a Network..... Enabled
11nSupport..... Enabled
802.11a Low Band..... Enabled
802.11a Mid Band..... Enabled
802.11a High Band..... Enabled
802.11a Operational Rates
802.11a 6M Rate..... Mandatory
802.11a 9M Rate..... Supported
802.11a 12M Rate..... Disabled
802.11a 18M Rate..... Supported
802.11a 24M Rate..... Mandatory
802.11a 36M Rate..... Supported
802.11a 48M Rate..... Supported
802.11a 54M Rate..... Supported
802.11n MCS Settings:
MCS 0..... Supported
MCS 1..... Supported
MCS 2..... Supported
MCS 3..... Supported
MCS 4..... Supported
MCS 5..... Supported
```

2. Las tarifas N se logran dos maneras. Acelera al esquema de codificación de la modulación (MCS) 7 puede ser logrado sin usar la vinculación del canal. Para el MCS valora sobre 7 y hasta 15, vinculación del canal necesita ser habilitado. Usted puede verificar si la vinculación del canal se habilita usando este **comando show** en el regulador:

```
(WiSM-slot3-2) >show advanced 802.11a channel
Automatic Channel Assignment
Channel Assignment Mode..... AUTO
Channel Update Interval..... 600 seconds [startup]
Anchor time (Hour of the day)..... 0
Channel Update Contribution..... SNI.
Channel Assignment Leader..... 00:1d:45:f0:d2:c0
Last Run..... 371 seconds ago
DCA Sensitivity Level..... STARTUP (5 dB)
DCA 802.11n Channel Width..... 40 MHz
```

```

Channel Energy Levels
Minimum..... unknown
Average..... unknown
Maximum..... unknown
Channel Dwell Times
Minimum..... unknown
Average..... unknown
Maximum..... unknown
802.11a 5 GHz Auto-RF Channel List
Allowed Channel List.....
36,40,44,48,52,56,60,64,149,
153,157,161
Unused Channel List.....
100,104,108,112,116,132,136,

```

3. Usted puede también configurar el ancho del canal por el AP usando estos comandos:

```

(WiSM-slot3-2) >show advanced 802.11a channel
Automatic Channel Assignment
Channel Assignment Mode..... AUTO
Channel Update Interval..... 600 seconds [startup]
Anchor time (Hour of the day)..... 0
Channel Update Contribution..... SNI.
Channel Assignment Leader..... 00:1d:45:f0:d2:c0
Last Run..... 371 seconds ago
DCA Sensitivity Level..... STARTUP (5 dB)
DCA 802.11n Channel Width..... 40 MHz
Channel Energy Levels
Minimum..... unknown
Average..... unknown
Maximum..... unknown
Channel Dwell Times
Minimum..... unknown
Average..... unknown
Maximum..... unknown
802.11a 5 GHz Auto-RF Channel List
Allowed Channel List.....
36,40,44,48,52,56,60,64,149,
153,157,161
Unused Channel List.....
100,104,108,112,116,132,136,

```

4. El intervalo del guardia y las tarifas correspondientes MCS ayudan a determinar las velocidades de datos que se consideran en los clientes 802.11n. Éstos son los comandos de verificar esta configuración:

```

(WiSM-slot3-2) >show 802.11a
802.11a Network..... Enabled
11nSupport..... Enabled
802.11a Low Band..... Enabled
802.11a Mid Band..... Enabled
802.11a High Band..... Enabled
802.11a Operational Rates
802.11a 6M Rate..... Mandatory
802.11a 9M Rate..... Supported
802.11a 12M Rate..... Disabled
802.11a 18M Rate..... Supported
802.11a 24M Rate..... Mandatory
802.11a 36M Rate..... Supported
802.11a 48M Rate..... Supported
802.11a 54M Rate..... Supported
802.11n MCS Settings:
MCS 0..... Supported
MCS 1..... Supported
MCS 2..... Supported
MCS 3..... Supported

```

```

MCS 4..... Supported
MCS 5..... Supported
MCS 6..... Supported
MCS 7..... Supported
MCS 8..... Supported
MCS 9..... Supported
MCS 10..... Supported
MCS 11..... Supported
MCS 12..... Supported
MCS 13..... Supported
MCS 14..... Supported
MCS 15..... Supported
802.11n Status:
A-MPDU Tx:
Priority 0..... Enabled
Priority 1..... Disabled
Priority 2..... Disabled
Priority 3..... Disabled
Priority 4..... Disabled
Priority 5..... Disabled
Priority 6..... Disabled
Priority 7..... Disabled
Beacon Interval..... 100
CF Pollable mandatory..... Disabled
CF Poll Request mandatory..... Disabled
--More-- or (q)uit
CFP Period..... 4
CFP Maximum Duration..... 60
Default Channel..... 36
Default Tx Power Level..... 1
DTPC Status..... Enabled
Fragmentation Threshold..... 2346
Pico-Cell Status..... Disabled
Pico-Cell-V2 Status..... Disabled
TI Threshold..... -50
Traffic Stream Metrics Status..... Disabled
Expedited BW Request Status..... Disabled
World Mode..... Enabled
EDCA profile type..... default-wmm
Voice MAC optimization status..... Disabled
Call Admission Control (CAC) configuration
Voice AC - Admission control (ACM)..... Enabled
Voice max RF bandwidth..... 75
Voice reserved roaming bandwidth..... 6
Voice load-based CAC mode..... Enabled
Voice tspec inactivity timeout..... Disabled
Video AC - Admission control (ACM)..... Disabled
Voice Stream-Size..... 84000
Voice Max-Streams..... 2
Video max RF bandwidth..... Infinite
Video reserved roaming bandwidth..... 0

```

Asegure la agregación del paquete A-MPDU. Para mejor esfuerzo, los niveles de QoS se habilitan vía estos comandos: **permiso de la prioridad 0 del tx del a-mpdu del 802.11a**
11nSupport de los config **permiso de la prioridad 0 del tx del a-mpdu del 802.11b** **11nSupport de los config**

5. Las tres Antenas en la radio A deben ser utilizadas. Asegurese las Antenas son el mismo modelo.
6. En la red inalámbrica (WLAN) configurada para la conectividad del cliente, WMM debe ser permitido o ser requerido, y el AES o el cifrado abierto debe ser utilizado solamente. Esto se puede verificar usando esta salida de comando:

```
(WiSM-slot2-2) >show wlan 1
```

```

WLAN Identifier..... 1
Profile Name..... wlab5WISMip22
Network Name (SSID)..... wlab5WISMip22
Status..... Enabled
MAC Filtering..... Disabled
Broadcast SSID..... Enabled
AAA Policy Override..... Disabled
Network Admission Control
NAC-State..... Disabled
Quarantine VLAN..... 0
Number of Active Clients..... 0
Exclusionlist Timeout..... 60 seconds
Session Timeout..... 1800 seconds
CHD per WLAN..... Enabled
Webauth DHCP exclusion..... Disabled
Interface..... management
WLAN ACL..... unconfigured
DHCP Server..... Default
DHCP Address Assignment Required..... Disabled
Quality of Service..... Silver (best effort)
WMM..... Allowed
CCX - AironetIe Support..... Enabled
CCX - Gratuitous ProbeResponse (GPR)..... Disabled
CCX - Diagnostics Channel Capability..... Disabled
Dot11-Phone Mode (7920)..... Disabled
Wired Protocol..... None
IPv6 Support..... Disabled
Peer-to-Peer Blocking Action..... Disabled
Radio Policy..... All
DTIM period for 802.11a radio..... 1
DTIM period for 802.11b radio..... 1
Radius Servers
Authentication..... Global Servers
Accounting..... Disabled
Local EAP Authentication..... Disabled
Security
802.11 Authentication:..... Open System
Static WEP Keys..... Disabled
802.1X..... Disabled
Wi-Fi Protected Access (WPA/WPA2)..... Enabled
WPA (SSN IE)..... Disabled
WPA2 (RSN IE)..... Enabled
TKIP Cipher..... Disabled
AES Cipher..... Enabled
Auth Key Management
802.1x..... Enabled
PSK..... Disabled
CCKM..... Disabled
FT(802.11r)..... Disabled
FT-PSK(802.11r)..... Disabled
FT Reassociation Timeout..... 20
FT Over-The-Air mode..... Enabled
FT Over-The-Ds mode..... Enabled
CKIP ..... Disabled
IP Security..... Disabled
IP Security Passthru..... Disabled
Web Based Authentication..... Disabled
Web-Passthrough..... Disabled
Conditional Web Redirect..... Disabled
Splash-Page Web Redirect..... Disabled
Auto Anchor..... Disabled
H-REAP Local Switching..... Enabled
H-REAP Learn IP Address..... Enabled
Infrastructure MFP protection..... Enabled (Global

```

```
Infrastructure
MFP Disabled)
Client MFP..... Optional
Tkip MIC Countermeasure Hold-down Timer..... 60
Call Snooping..... Disabled
Band Select..... Enabled
Load Balancing..... Enabled
```

7. Diversidad de antena: si usa solamente dos Antenas por cualquier motivo, usted necesita utilizar la antena A y B para transmisor /receptor los puertos.

En el lado del cliente:

1. Supplicant usado para controlar la placa de red inalámbrica, preferida para hacer juego al vendedor del supplicant a la placa de red inalámbrica.
2. Driveres de cliente: usted necesita asegurarse los últimos driveres de cliente se está ejecutando en las placas de red inalámbrica.
3. Entre en contacto a su vendedor del adaptador de red inalámbrica.
4. Asegúrese le están utilizando 11n certificó el adaptador para alcanzar las velocidades de datos 11n.

Productos del con certificación Wi-Fi:

http://www.wi-fi.org/certified_products.php

Cómo mejorar el funcionamiento:

1. Uso del canal — Uso del canal del informe de los analizadores de red en el porcentaje de transmitir pasado tiempo y de recibir las tramas. Esto ayuda a medir la variación potencial en la velocidad debida distanciarse de un Punto de acceso. Esto ayudará a monitorear y ver por ejemplo, si un canal es completamente el transmitir ocupado en 1Mbps bajo condiciones ideales se realizaría en 0.94Mbps bajo utilización del 100%.
2. El medio físico usado en Tecnología inalámbrica también dicta los funcionamientos. Usando 802.11g o el 802.11a sobre el 802.11b ofrece a mucho los más altos rendimientos, a menudo hasta el 30 mbps sobre el 802.11b donde una capacidad de la radio 6mpbs se divide entre todas las estaciones asociadas.
3. Tamaños de celda — Se recomienda para encoger los tamaños de celda para tener los clientes como más cercano a los AP como sea posible. Esto beneficiará a las velocidades de datos en las cuales el cliente puede conectar con el AP. Esto puede ser hecha reduciendo los niveles de potencia en el AP al más bajo.
4. El tamaño de celda que encoge también disminuye interferencia del cocanal. Si usan RRM, los AP deben escoger los canales dinámicamente por el despliegue. Sin embargo, si implementa la asignación dinámica del canal, asegúrese de que usted no tenga dos AP en los niveles de potencia alta en la misma derecha del canal al lado de uno a.
5. La protección también hace la producción golpear.

Cómo calcular la producción vía el iPerf

Extremidades de la configuración de Iperf

Para esos clientes o probadores que no posean el carro, Iperf se puede utilizar en lugar de otro. Esto está disponible en http://www.macalester.edu/crash/software/pc/iperf/kperf_setup.exe.

Rendimiento de procesamiento de TCP de medición

Funcione con este comando en el lado del servidor:

```
(WiSM-slot2-2) >show wlan 1
WLAN Identifier..... 1
Profile Name..... wlab5WISMip22
Network Name (SSID)..... wlab5WISMip22
Status..... Enabled
MAC Filtering..... Disabled
Broadcast SSID..... Enabled
AAA Policy Override..... Disabled
Network Admission Control
NAC-State..... Disabled
Quarantine VLAN..... 0
Number of Active Clients..... 0
Exclusionlist Timeout..... 60 seconds
Session Timeout..... 1800 seconds
CHD per WLAN..... Enabled
Webauth DHCP exclusion..... Disabled
Interface..... management
WLAN ACL..... unconfigured
DHCP Server..... Default
DHCP Address Assignment Required..... Disabled
Quality of Service..... Silver (best effort)
WMM..... Allowed
CCX - AironetIe Support..... Enabled
CCX - Gratuitous ProbeResponse (GPR)..... Disabled
CCX - Diagnostics Channel Capability..... Disabled
Dot11-Phone Mode (7920)..... Disabled
Wired Protocol..... None
IPv6 Support..... Disabled
Peer-to-Peer Blocking Action..... Disabled
Radio Policy..... All
DTIM period for 802.11a radio..... 1
DTIM period for 802.11b radio..... 1
Radius Servers
Authentication..... Global Servers
Accounting..... Disabled
Local EAP Authentication..... Disabled
Security
802.11 Authentication:..... Open System
Static WEP Keys..... Disabled
802.1X..... Disabled
Wi-Fi Protected Access (WPA/WPA2)..... Enabled
WPA (SSN IE)..... Disabled
WPA2 (RSN IE)..... Enabled
TKIP Cipher..... Disabled
AES Cipher..... Enabled
Auth Key Management
802.1x..... Enabled
PSK..... Disabled
CCKM..... Disabled
FT(802.11r)..... Disabled
FT-PSK(802.11r)..... Disabled
FT Reassociation Timeout..... 20
FT Over-The-Air mode..... Enabled
FT Over-The-Ds mode..... Enabled
CKIP ..... Disabled
IP Security..... Disabled
IP Security Passthru..... Disabled
```

```

Web Based Authentication..... Disabled
Web-Passthrough..... Disabled
Conditional Web Redirect..... Disabled
Splash-Page Web Redirect..... Disabled
Auto Anchor..... Disabled
H-REAP Local Switching..... Enabled
H-REAP Learn IP Address..... Enabled
Infrastructure MFP protection..... Enabled (Global
Infrastructure
MFP Disabled)
Client MFP..... Optional
Tkip MIC Countermeasure Hold-down Timer..... 60
Call Snooping..... Disabled
Band Select..... Enabled
Load Balancing..... Enabled

```

Funcione con este comando en el lado del cliente:

```

(WiSM-slot2-2) >show wlan 1
WLAN Identifier..... 1
Profile Name..... wlab5WISMip22
Network Name (SSID)..... wlab5WISMip22
Status..... Enabled
MAC Filtering..... Disabled
Broadcast SSID..... Enabled
AAA Policy Override..... Disabled
Network Admission Control
NAC-State..... Disabled
Quarantine VLAN..... 0
Number of Active Clients..... 0
Exclusionlist Timeout..... 60 seconds
Session Timeout..... 1800 seconds
CHD per WLAN..... Enabled
Webauth DHCP exclusion..... Disabled
Interface..... management
WLAN ACL..... unconfigured
DHCP Server..... Default
DHCP Address Assignment Required..... Disabled
Quality of Service..... Silver (best effort)
WMM..... Allowed
CCX - AironetIe Support..... Enabled
CCX - Gratuitous ProbeResponse (GPR)..... Disabled
CCX - Diagnostics Channel Capability..... Disabled
Dot11-Phone Mode (7920)..... Disabled
Wired Protocol..... None
IPv6 Support..... Disabled
Peer-to-Peer Blocking Action..... Disabled
Radio Policy..... All
DTIM period for 802.11a radio..... 1
DTIM period for 802.11b radio..... 1
Radius Servers
Authentication..... Global Servers
Accounting..... Disabled
Local EAP Authentication..... Disabled
Security
802.11 Authentication:..... Open System
Static WEP Keys..... Disabled
802.1X..... Disabled
Wi-Fi Protected Access (WPA/WPA2)..... Enabled
WPA (SSN IE)..... Disabled
WPA2 (RSN IE)..... Enabled
TKIP Cipher..... Disabled
AES Cipher..... Enabled

```



```

Auth Key Management
802.1x..... Enabled
PSK..... Disabled
CCKM..... Disabled
FT(802.11r)..... Disabled
FT-PSK(802.11r)..... Disabled
FT Reassociation Timeout..... 20
FT Over-The-Air mode..... Enabled
FT Over-The-Ds mode..... Enabled
CKIP ..... Disabled
IP Security..... Disabled
IP Security Passthru..... Disabled
Web Based Authentication..... Disabled
Web-Passthrough..... Disabled
Conditional Web Redirect..... Disabled
Splash-Page Web Redirect..... Disabled
Auto Anchor..... Disabled
H-REAP Local Switching..... Enabled
H-REAP Learn IP Address..... Enabled
Infrastructure MFP protection..... Enabled (Global
Infrastructure
MFP Disabled)
Client MFP..... Optional
Tkip MIC Countermeasure Hold-down Timer..... 60
Call Snooping..... Disabled
Band Select..... Enabled
Load Balancing..... Enabled

```

```

-----
Server listening on TCP port 5001
TCP window size: 256 KByte
-----

```

```

-----
Client connecting to 10.10.10.10, TCP port 5001
TCP window size: 256 KByte
-----

```

```

[1788] local 10.10.10.20 port 1155 connected with 10.10.10.10 port 5001
[1820] local 10.10.10.20 port 1153 connected with 10.10.10.10 port 5001
[1868] local 10.10.10.20 port 1150 connected with 10.10.10.10 port 5001
[1836] local 10.10.10.20 port 1152 connected with 10.10.10.10 port 5001
[1804] local 10.10.10.20 port 1154 connected with 10.10.10.10 port 5001
[1852] local 10.10.10.20 port 1151 connected with 10.10.10.10 port 5001
[ ID] Interval      Transfer      Bandwidth
[1788] 0.0-60.1 sec    124 MBytes   17.3 Mbits/sec
[1868] 0.0-60.1 sec    123 MBytes   17.1 Mbits/sec
[1820] 0.0-60.2 sec    110 MBytes   15.4 Mbits/sec
[1804] 0.0-60.1 sec    84.6 MBytes  11.8 Mbits/sec
[1852] 0.0-60.1 sec    89.2 MBytes  12.4 Mbits/sec
[1836] 0.0-60.2 sec    86.3 MBytes  12.0 Mbits/sec
[SUM] 0.0-60.2 sec    617 MBytes   86.0 Mbits/sec
[1952] local 10.10.10.20 port 5001 connected with 10.10.10.10 port 2663
[1832] local 10.10.10.20 port 5001 connected with 10.10.10.10 port 2664
[1748] local 10.10.10.20 port 5001 connected with 10.10.10.10 port 2665
[1732] local 10.10.10.20 port 5001 connected with 10.10.10.10 port 2666
[1800] local 10.10.10.20 port 5001 connected with 10.10.10.10 port 2667
[1812] local 10.10.10.20 port 5001 connected with 10.10.10.10 port 2668
[ ID] Interval      Transfer      Bandwidth
[1800] 0.0-60.0 sec    114 MBytes   15.9 Mbits/sec
[1812] 0.0-60.0 sec    117 MBytes   16.3 Mbits/sec
[1952] 0.0-60.1 sec    89.6 MBytes  12.5 Mbits/sec
[1748] 0.0-60.1 sec    129 MBytes   18.1 Mbits/sec
[1732] 0.0-60.1 sec    111 MBytes   15.5 Mbits/sec
[1832] 0.0-60.1 sec    112 MBytes   15.6 Mbits/sec
[SUM] 0.0-60.1 sec    672 MBytes   93.8 Mbits/sec

```

El primer número circundado en esta imagen representa el rendimiento de procesamiento ascendente, el segundo número circundado representa (AP al cliente) la producción río abajo.

Producción de medición UDP

Cierre las aplicaciones anteriores de Iperf en ambos el costado del servidor y el cliente. Ambos necesitan ser configurados otra vez, solamente este vez para la prueba de rendimiento UDP.

Funcione con este comando en el lado del servidor:

```
(WiSM-slot2-2) >show wlan 1
WLAN Identifier..... 1
Profile Name..... wlab5WISMip22
Network Name (SSID)..... wlab5WISMip22
Status..... Enabled
MAC Filtering..... Disabled
Broadcast SSID..... Enabled
AAA Policy Override..... Disabled
Network Admission Control
NAC-State..... Disabled
Quarantine VLAN..... 0
Number of Active Clients..... 0
Exclusionlist Timeout..... 60 seconds
Session Timeout..... 1800 seconds
CHD per WLAN..... Enabled
Webauth DHCP exclusion..... Disabled
Interface..... management
WLAN ACL..... unconfigured
DHCP Server..... Default
DHCP Address Assignment Required..... Disabled
Quality of Service..... Silver (best effort)
WMM..... Allowed
CCX - AironetIe Support..... Enabled
CCX - Gratuitous ProbeResponse (GPR)..... Disabled
CCX - Diagnostics Channel Capability..... Disabled
Dot11-Phone Mode (7920)..... Disabled
Wired Protocol..... None
IPv6 Support..... Disabled
Peer-to-Peer Blocking Action..... Disabled
Radio Policy..... All
DTIM period for 802.11a radio..... 1
DTIM period for 802.11b radio..... 1
Radius Servers
Authentication..... Global Servers
Accounting..... Disabled
Local EAP Authentication..... Disabled
Security
802.11 Authentication:..... Open System
Static WEP Keys..... Disabled
802.1X..... Disabled
Wi-Fi Protected Access (WPA/WPA2)..... Enabled
WPA (SSN IE)..... Disabled
WPA2 (RSN IE)..... Enabled
TKIP Cipher..... Disabled
AES Cipher..... Enabled
Auth Key Management
802.1x..... Enabled
PSK..... Disabled
CCKM..... Disabled
FT(802.11r)..... Disabled
FT-PSK(802.11r)..... Disabled
FT Reassociation Timeout..... 20
FT Over-The-Air mode..... Enabled
FT Over-The-Ds mode..... Enabled
```

```

CKIP ..... Disabled
IP Security..... Disabled
IP Security Passthru..... Disabled
Web Based Authentication..... Disabled
Web-Passthrough..... Disabled
Conditional Web Redirect..... Disabled
Splash-Page Web Redirect..... Disabled
Auto Anchor..... Disabled
H-REAP Local Switching..... Enabled
H-REAP Learn IP Address..... Enabled
Infrastructure MFP protection..... Enabled (Global
Infrastructure
MFP Disabled)
Client MFP..... Optional
Tkip MIC Countermeasure Hold-down Timer..... 60
Call Snooping..... Disabled
Band Select..... Enabled
Load Balancing..... Enabled

```

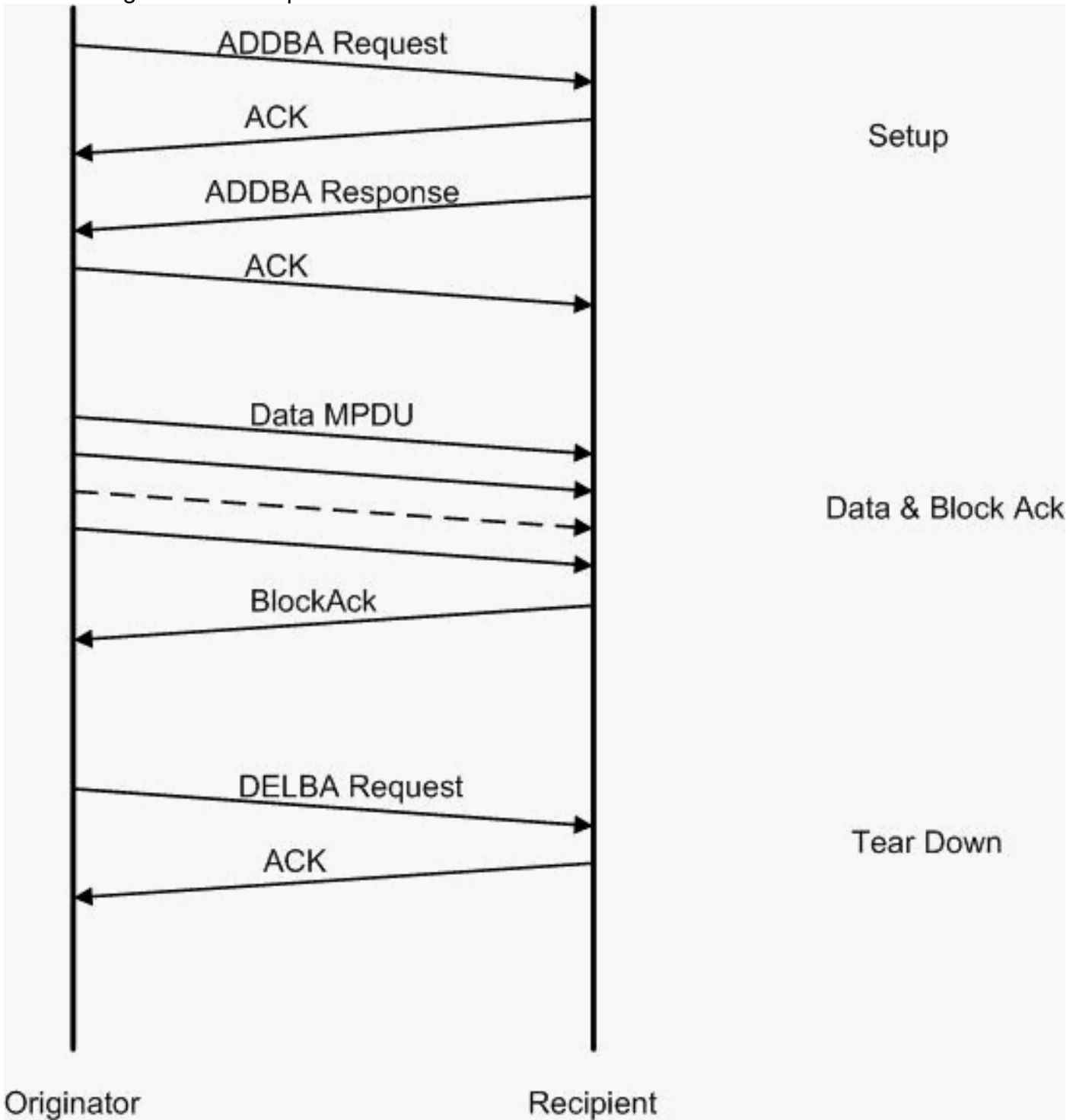
Funcione con este comando en el lado del cliente:

```

(WiSM-slot2-2) >show wlan 1
WLAN Identifier..... 1
Profile Name..... wlab5WISMip22
Network Name (SSID)..... wlab5WISMip22
Status..... Enabled
MAC Filtering..... Disabled
Broadcast SSID..... Enabled
AAA Policy Override..... Disabled
Network Admission Control
NAC-State..... Disabled
Quarantine VLAN..... 0
Number of Active Clients..... 0
Exclusionlist Timeout..... 60 seconds
Session Timeout..... 1800 seconds
CHD per WLAN..... Enabled
Webauth DHCP exclusion..... Disabled
Interface..... management
WLAN ACL..... unconfigured
DHCP Server..... Default
DHCP Address Assignment Required..... Disabled
Quality of Service..... Silver (best effort)
WMM..... Allowed
CCX - AironetIe Support..... Enabled
CCX - Gratuitous ProbeResponse (GPR)..... Disabled
CCX - Diagnostics Channel Capability..... Disabled
Dot11-Phone Mode (7920)..... Disabled
Wired Protocol..... None
IPv6 Support..... Disabled
Peer-to-Peer Blocking Action..... Disabled
Radio Policy..... All
DTIM period for 802.11a radio..... 1
DTIM period for 802.11b radio..... 1
Radius Servers
Authentication..... Global Servers
Accounting..... Disabled
Local EAP Authentication..... Disabled
Security
802.11 Authentication:..... Open System
Static WEP Keys..... Disabled
802.1X..... Disabled
Wi-Fi Protected Access (WPA/WPA2)..... Enabled
WPA (SSN IE)..... Disabled

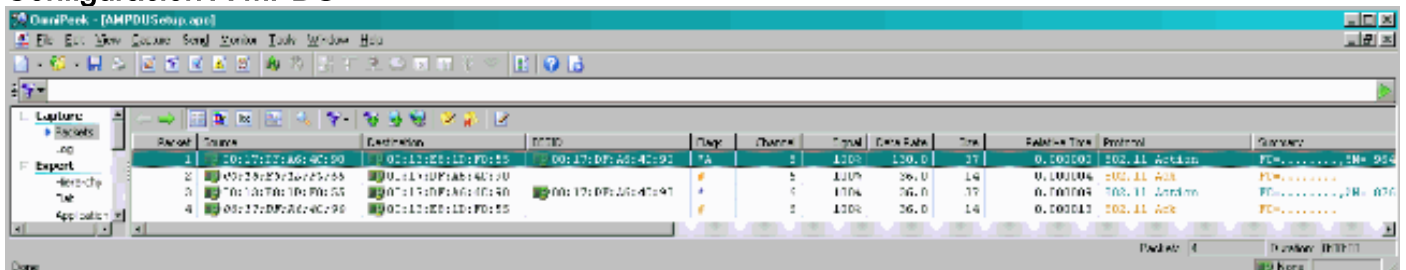
```


- Indicación que el paquete es los datos A-MPDU en el (PLCP) del Procedimiento de convergencia de la capa física.



Éste es un ejemplo de las capturas de Omnipcap para analizar la **unidad de datos global del protocolo MAC**:

Configuración A-MPDU



- ADDBA — Agregue el acuse de recibo del bloque
- Petición ADDBA — Contiene el identificador, la directiva Ack del bloque, el tamaño de almacén intermedio, el etc.
- Respuesta ADDBA — Puede cambiar la directiva y el tamaño de almacén intermedio.

Configuración A-MPDU

- Petición ADDBA
- AP1250 utiliza un descanso de cero para no indicar ningún descanso.

OmniPeek - [AMPDUSetup.apc - Packet #1]

File Edit View Capture Send Monitor Tools Window Help

Packet: 1

802.11 MAC Header

- Version: 0
- Type: %00 Management
- Subtype: %1101 Management Action
- Frame Control Flags: %00000000
 - 0... .. Non-strict order
 - .0.. .. Non-Protected Frame
 - ..0. .. No More Data
 - ...0 Power Management - active mode
 - 0... This is not a Re-Transmission
 -0.. Last or Unfragmented Frame
 -0. Not an Exit from the Distribution System
 -0 Not to the Distribution System
- Duration: 40 Microseconds
- Destination: 00:13:E8:1D:F0:55
- Source: 00:17:DF:A6:4C:90
- BSSID: 00:17:DF:A6:4C:90
- Seq Number: 964
- Frag Number: 0

802.11 Management - Action

- Category Code: 3 Block Ack
- Action Code: 0 ADDBA Request
- Dialog Token: 1
- BlockAck Param Set: %0001000000000010
 - ..0000.. TID: 0
 - 1. BlockAck Policy: Immediate Block Ack
 - 0 A-MSDU: Not Permitted
- BlockAck Timeout Value: 0 TUs
- BA Starting Sequence Control: %0000001001010000
 - ..0000 Starting Seq Number: 37
 - 0000 Fragment Number: 0

FCS - Frame Check Sequence

- FCS: 0x36E63FB9

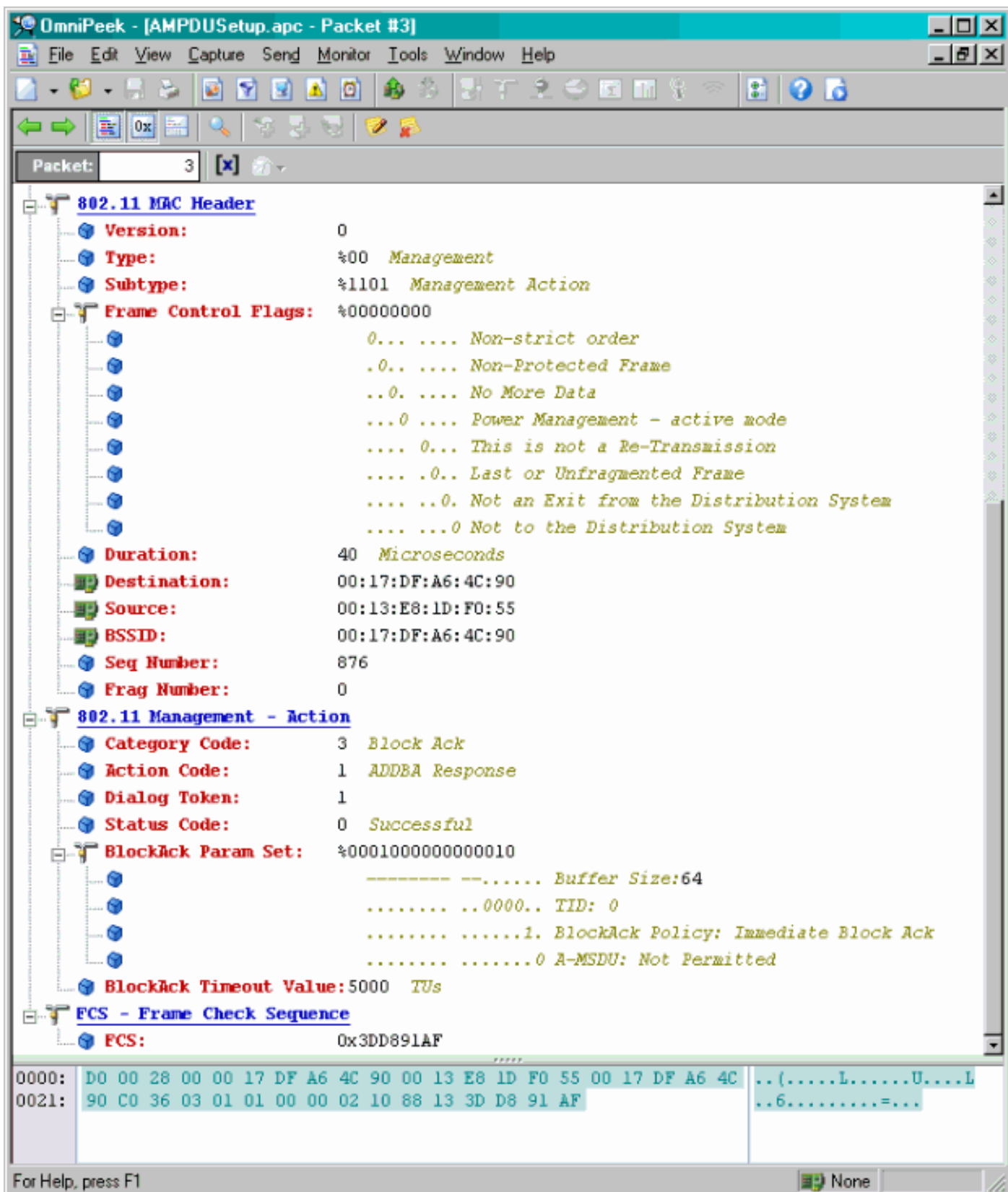
0000: D0 00 28 00 00 13 E8 1D F0 55 00 17 DF A6 4C 90 00 17 DF A6 4C ..{.....U....L....L

0021: 90 40 3C 03 00 01 02 10 00 00 50 02 36 E6 3F B9 .@<.....P.6.?.

For Help, press F1

Configuración A-MPDU

- Respuesta ADDBA
- El receptor necesita indicar que acuerdo Ack del bloque fuera establecido con éxito.



Transferencia de datos A-MPDU

- El bloque Ack contiene la BITMAP comprimida para indicar que MPDUs recibió.
- Refiera a la sección 9.10.7" de IEEE 802.11n las Extensiones HT-inmediatas Ack del bloque" para la información sobre el envío del bloque Ack.

Packet	Source	Destination	SSID	Rate	Channel	Signal	Data Rate	Size	Rate vs Time	Protocol
1	00:13:8E:26:19:77	00:14:5E:57:7E:A1	00:16:01:0F:03:5E	A	1	100%	130.0	78	0.00020	TCP
2	00:13:8E:26:19:77	00:14:5E:57:7E:A1	00:16:01:0F:03:5E	A	1	100%	130.0	78	0.00065	TCP
3	00:13:8E:26:19:77	00:14:5E:57:7E:A1	00:16:01:0F:03:5E	A	1	100%	130.0	78	0.00098	TCP
4	00:13:8E:26:19:77	00:14:5E:57:7E:A1	00:16:01:0F:03:5E	A	1	100%	130.0	78	0.00011	TCP
5	00:13:8E:26:19:77	00:14:5E:57:7E:A1	00:16:01:0F:03:5E	A	1	100%	130.0	78	0.00014	TCP
6	00:13:8E:26:19:77	00:14:5E:57:7E:A1	00:16:01:0F:03:5E	A	1	100%	130.0	78	0.00017	TCP
7	00:13:8E:26:19:77	00:14:5E:57:7E:A1	00:16:01:0F:03:5E	A	1	100%	130.0	78	0.00020	TCP
8	00:16:01:0F:03:5E	00:13:8E:26:19:77		A	1	100%	35.0	33	0.00073	003.11 BA

Capacidades des divulgación en los faros

HT Capability Info

Element ID: 45 HT Capability Info

Length: 26

HT Capability Info: %0001100001101110

- 0..... L-SIG TXOP Protection Support: Not Supported
- .0..... AP allows use of 40MHz Transmissions In Neighboring BSSs
- ..0..... Device/BSS does Not Support use of PSMP
- ...1..... BSS does Allow use of DSSS/CCK Rates @40MHz
-1..... Maximal A-MSDU size: 7935 bytes
-0.. Does Not Support HT-Delayed BlockAck Operation
-00..... No Rx STBC Support
-0..... Transmitter does Not Support Tx STBC
-1..... Short GI for 40 MHz: Supported
-1..... Short GI for 20 MHz: Supported
-0.... Device is Not Able to Receive PPDU with GF Preamble
-11.. Spatial Multiplexing Enabled
-1. Both 20MHz and 40MHz Operation is Supported
-0 LDPC coding capability: Not Supported

A-MPDU Parameters: %00011011

- xxx..... Reserved
- ...110.. Minimum MPDU Start Spacing: 8 usec
-11 Maximum Rx A-MPDU Size: 64K

Supported MCS Set

One Spatial Stream: %11111111

- MCS Index 0 Supported - BPSK. Coding Rate: 1/2
- MCS Index 1 Supported - QPSK. Coding Rate: 1/2
- MCS Index 2 Supported - QPSK. Coding Rate: 3/4
- MCS Index 3 Supported - 16 QAM. Coding Rate: 1/2
- MCS Index 4 Supported - 16 QAM. Coding Rate: 3/4
- MCS Index 5 Supported - 64 QAM. Coding Rate: 2/3
- MCS Index 6 Supported - 64 QAM. Coding Rate: 3/4
- MCS Index 7 Supported - 64 QAM. Coding Rate: 5/6

Two Spatial Streams: %01111111

- MCS Index 8 Supported - BPSK. Coding Rate: 1/2
- MCS Index 9 Supported - QPSK. Coding Rate: 1/2
- MCS Index 10 Supported - QPSK. Coding Rate: 3/4
- MCS Index 11 Supported - 16 QAM. Coding Rate: 1/2
- MCS Index 12 Supported - 16 QAM. Coding Rate: 3/4
- MCS Index 13 Supported - 64 QAM. Coding Rate: 2/3
- MCS Index 14 Supported - 64 QAM. Coding Rate: 3/4
- MCS Index 15 Not Supported - 64 QAM. Coding Rate: 5/6

Rx Bitmask b16-b23: %00000000

Rx Bitmask b24-b31: %00000000

Rx Bitmask b32-b39: %00000000

Rx Bitmask b40-b47: %00000000

Rx Bitmask b48-b55: %00000000


```

Element ID: 61 Additional HT Information
Length: 22
Primary Channel: 6
Srvc Int Granularity: 4000 5ms
PSMP STAs Only: 40 Association Requests are Accepted Regardless of PSMP Capability
RIFS Mode: 41 Use of RIFS Permitted
STA Channel Width: 41 Use Any Channel Width Enabled Under Supported Channel Width Set
2nd Channel Offset: 401 Above the Primary Channel
HT Info Element 2: 40000000000000100
XXXXXXXX XXX..... Reserved
..... 0.... OBSS Non-HT STAs: Use of Protection for Non-HT STAs Not Needed
..... 0.... Transmit Burst Limit: No Limit
..... 1.. Non-Greenfield STAs: One or more HT STAs are Not Greenfield Capable
..... 00 Operating Mode: Pure HT (No Protection) - All STAs in the BSS are 20/40 MHz HT
HT Info Element 3: 40000000000000000
XXXX..... Reserved
..... 0.... PCO Phase: Switch To/Continue Use 2GHz Phase
..... 0.. PCO Active: Not Active in the BSS
..... 0. L-SIG TNDP Protection: Not Full Support
..... 0 Secondary Beacon: Primary Beacon
..... 0..... Dual CTS Protection: Not Required
..... 0..... Dual Beacon: No Secondary Beacon Transmitted
..... .XXXXX Reserved
Basic MCS Set
One Spatial Stream: 400000000
MCS Index 0 Not Supported - BPSK, Coding Rate: 1/2
MCS Index 1 Not Supported - QPSK, Coding Rate: 1/2
MCS Index 2 Not Supported - QPSK, Coding Rate: 3/4
MCS Index 3 Not Supported - 16 QAM, Coding Rate: 1/2
MCS Index 4 Not Supported - 16 QAM, Coding Rate: 3/4
MCS Index 5 Not Supported - 64 QAM, Coding Rate: 2/3
MCS Index 6 Not Supported - 64 QAM, Coding Rate: 3/4
MCS Index 7 Not Supported - 64 QAM, Coding Rate: 5/6
Two Spatial Streams: 400000000
MCS Index 8 Not Supported - BPSK, Coding Rate: 1/2
MCS Index 9 Not Supported - QPSK, Coding Rate: 1/2
MCS Index 10 Not Supported - QPSK, Coding Rate: 3/4
MCS Index 11 Not Supported - 16 QAM, Coding Rate: 1/2
MCS Index 12 Not Supported - 16 QAM, Coding Rate: 3/4
MCS Index 13 Not Supported - 64 QAM, Coding Rate: 2/3
MCS Index 14 Not Supported - 64 QAM, Coding Rate: 3/4
MCS Index 15 Not Supported - 64 QAM, Coding Rate: 5/6
Rx Bitmask b16-b23: 400000000
Rx Bitmask b24-b31: 400000000
Rx Bitmask b32-b39: 400000000
Rx Bitmask b40-b47: 400000000

```

Asociación similar con la adición del bloque Ack puesta para A-MPDU:

194	00:13:E8:1D:F0:55	00:17:DF:A6:4C:90	802.11 Ack		#	100%	6.0	14
195	00:17:DF:A6:4C:90	Ethernet Broadcast	802.11 Beacon	00:17:DF:A6:4C:90	*	100%	6.0	204
196	00:13:E8:1D:F0:55	Ethernet Broadcast	802.11 Probe Req	Ethernet Broadcast	*	100%	1.0	81
197	00:17:DF:A6:4C:90	00:13:E8:1D:F0:55	802.11 Probe Rsp	00:17:DF:A6:4C:90	*+	100%	6.0	204
198	00:13:E8:1D:F0:55	00:17:DF:A6:4C:90	802.11 Ack		#	100%	6.0	14
199	00:13:CE:89:DC:A2	Ethernet Broadcast	802.11 Probe Req	Ethernet Broadcast	*	100%	1.0	87
200	00:13:E8:36:19:77	Ethernet Broadcast	802.11 Probe Req	Ethernet Broadcast	*	100%	1.0	81
201	00:17:DF:A6:4C:90	00:13:E8:36:19:77	802.11 Probe Rsp	00:17:DF:A6:4C:90	*+	100%	6.0	204
202	00:13:E8:36:19:77	00:17:DF:A6:4C:90	802.11 Ack		#	100%	6.0	14
203	00:13:E8:36:19:77	Ethernet Broadcast	802.11 Probe Req	Ethernet Broadcast	*	100%	1.0	74
204	00:13:E8:36:19:77	Ethernet Broadcast	802.11 Probe Req	Ethernet Broadcast	*	100%	1.0	81
205	00:17:DF:A6:4C:90	00:13:E8:36:19:77	802.11 Probe Rsp	00:17:DF:A6:4C:90	*+	100%	6.0	204
206	00:13:E8:36:19:77	00:17:DF:A6:4C:90	802.11 Ack		#	100%	6.0	14
207	00:13:CE:89:DC:A2	Ethernet Broadcast	802.11 Probe Req	Ethernet Broadcast	*	52%	1.0	55
208	00:13:CE:89:DC:A2	Ethernet Broadcast	802.11 Probe Req	Ethernet Broadcast	*	97%	1.0	55
209	00:13:CE:89:DC:A2	Ethernet Broadcast	802.11 Probe Req	Ethernet Broadcast	*	100%	1.0	87
210	00:13:CE:89:DC:A2	Ethernet Broadcast	802.11 Probe Req	Ethernet Broadcast	*	100%	1.0	55
211	00:17:DF:A6:4C:90	Ethernet Broadcast	802.11 Beacon	00:17:DF:A6:4C:90	*	100%	6.0	204
212	00:13:CE:89:DC:A2	Ethernet Broadcast	802.11 Probe Req	Ethernet Broadcast	*	95%	1.0	55
213	00:13:CE:89:DC:A2	Ethernet Broadcast	802.11 Probe Req	Ethernet Broadcast	*	100%	1.0	87
214	00:13:CE:89:DC:A2	Ethernet Broadcast	802.11 Probe Req	Ethernet Broadcast	*	100%	1.0	55
215	00:13:E8:1D:F0:55	00:17:DF:A6:4C:90	802.11 Auth	00:17:DF:A6:4C:90	*	100%	36.0	34
216	00:17:DF:A6:4C:90	00:13:E8:1D:F0:55	802.11 Ack		#	100%	36.0	14
217	00:17:DF:A6:4C:90	00:13:E8:1D:F0:55	802.11 Auth	00:17:DF:A6:4C:90	*	100%	36.0	34
218	00:13:E8:1D:F0:55	00:17:DF:A6:4C:90	802.11 Ack		#	100%	36.0	14
219	00:13:E8:1D:F0:55	00:17:DF:A6:4C:90	802.11 Assoc Req	00:17:DF:A6:4C:90	*	100%	36.0	134
220	00:17:DF:A6:4C:90	00:13:E8:1D:F0:55	802.11 Ack		#	100%	36.0	14
221	00:17:DF:A6:4C:90	00:13:E8:1D:F0:55	802.11 Assoc Rsp	00:17:DF:A6:4C:90	*	100%	130.0	180
222	00:13:E8:1D:F0:55	00:17:DF:A6:4C:90	802.11 Ack		#	100%	36.0	14
223	192.168.170.89	224.0.0.1	IGMP	00:17:DF:A6:4C:90		100%	130.0	84
224	00:13:E8:1D:F0:55	00:17:DF:A6:4C:90	802.11 Ack		#	100%	36.0	14
225	192.168.170.89	224.0.0.1	IGMP	00:17:DF:A6:4C:90	+	100%	130.0	84
226	00:13:E8:1D:F0:55	00:17:DF:A6:4C:90	802.11 Ack		#	100%	36.0	14
227	00:17:DF:A6:4C:90	00:13:E8:1D:F0:55	WLCPP	00:17:DF:A6:4C:90		100%	130.0	92
228	00:13:E8:1D:F0:55	00:17:DF:A6:4C:90	802.11 Ack		#	100%	36.0	14
229	00:17:DF:A6:4C:90	00:13:E8:1D:F0:55	802.11 Action	00:17:DF:A6:4C:90	*	100%	130.0	37
230	00:13:E8:1D:F0:55	00:17:DF:A6:4C:90	802.11 Ack		#	100%	36.0	14
231	00:13:E8:1D:F0:55	00:17:DF:A6:4C:90	802.11 Action	00:17:DF:A6:4C:90	*	100%	36.0	37
232	00:17:DF:A6:4C:90	00:13:E8:1D:F0:55	802.11 Ack		#	100%	36.0	14

Verifying A-MPDU is enabled on the controller

The image shows a Wireshark packet capture of an 802.11 Beacon frame. The 'HT Capability Info' section is expanded, showing the following details:

- Element ID: 45 HT Capability Info [63]
- Length: 26 [64]
- HT Capability Info: 0000100001101110 [65-96]
 - 0..... 1-STS TXOP Protection Support: Not Supported
 - ..0..... AP allows use of 4096u Transmissions In Neighboring BSSs
 - ...0..... Device/BSS does Not Support use of TXOP
 -2..... BSS does Allow use of 2000u CCK Rates (4096u)
 -1..... Maximal A-MPDU size: 7935 bytes
 -0..... Does Not Support HT-Delayed BlockAck Operation
 -00..... No Rx STBC Support
 -0..... Transmitter does Not Support Tx STBC
 -1..... Short GI for 40 Mbit/s Supported
 -1..... Short GI for 20 Mbit/s Supported
 -0..... Device is Not Able to Receive 2200u with GI Freeable
 -11..... Spatial Multiplexing Enabled
 -1..... Both 20Mbit/s and 40Mbit/s Operation is Supported
 -0..... LDPC coding capability: Not Supported
- A-MPDU Parameters: 00001011 [97]
 - ...0..... Reserved [07 Back 0x00]
 - ...110... Minimum MPDU Start Spacing: 2 used [07 Back 0x1c]
 -11 Maximum Rx A-MPDU Size: 64K [07 Back 0x03]
- Supported MCS Set

An arrow points from the 'A-MPDU Parameters' section to the text 'A-MPDU enabled and seen in the beacon'.

Above is a beacon frame from an SSID enabled for n rates

802.11A Beacon frame

```
Packet Info Packet Number=57 Flags=0x00000000 Status=0x00000000 Packet Length=150 Timestamp=17:29:12.36369900 01/21/2010 Data Rate=11.4 Mbps Chan=36 52.80 MHz  
[0-23] 802.11 MAC Header Version=0 Type=00 Management SubType=41000 Beacon Duration=0 Microseconds Destination=FF:FF:FF:FF:FF:FF Source=00:14:97:8A:84:8E BSSID=00:14:97:8A:84:8E  
802.11 Management - Beacon  
  TimeStamp: 37048868 Microseconds [10-11]  
  Beacon Interval: 300 [10-11]  
  Capability Info=0000000000000000  
  Rates: ID=1 Rates: Len=0 Rate=0.0 Mbps Rate=0.0 Mbps Rate=12.0 Mbps Rate=18.0 Mbps Rate=24.0 Mbps Rate=36.0 Mbps Rate=48.0 Mbps Rate=54.0 Mbps  
  TIM: ID=5 TIM: Len=4 TIM Count=0 TIM Period=1 Bitmap Control=00000000 Part Virt. Smap=0x00  
  Country ID=7 Country Len=18 Country Code=00 Starting Channel=36 Number of Channels=4 Max Tx Power (dBm)=20 Starting Channel=36 Number of Channels=4 Max Tx Power (dBm)=20 Start  
  BSS: ID=11 BSS: Len=5 Station Count=0 Channel Utilization=0x10 / Avail. Admission Capacity=23407  
  ID=150 Len=6 Value=0x00409600P00  
  MIB: ID=221 MIB Len=24 MIB=00-50-F2 MIB Type=2 MIB SubType=1 Parameter Element Version=1  
  Vendor Specific ID=221 Vendor Specific Len=4 MIB=00-40-94 Data=(3 bytes)  
  Vendor Specific ID=221 Vendor Specific Len=4 MIB=00-40-94 Version=0 CCX Version=1  
  Vendor Specific ID=221 Vendor Specific Len=4 MIB=00-40-94 Data=(2 bytes)  
  Vendor Specific ID=221 Vendor Specific Len=4 MIB=00-40-94 Data=(2 bytes)  
FCS - Frame Check Sequence  
  FCS: 0x51420932 Calculated
```

Información Relacionada

- [Soporte Técnico y Documentación - Cisco Systems](#)