802.11n速度故障排除

目錄

簡介

本文說明排除無線吞吐量問題時需要考慮的常見問題。本文包括使用工具來測量無線網路的效能和吞吐量，其中包括在類似測試條件下與Cisco 1252 AP進行比較的不同供應商802.11n接入點(AP)。

必要條件

需求

思科建議您瞭解以下要求：

- 工具（如iPerf）和網路分析器（如OmniPeek和Cisco Spectrum Analysis）
- 支援802.11n的1140、1250、3500和1260系列AP

採用元件

本文中的資訊係根據以下軟體和硬體版本：

- 運行軟體版本6.0.182的WS-SVC-WiSM控制器
- AIR-LAP1142-A-K9 AP

慣例

如需文件慣例的詳細資訊，請參閱思科技術提示慣例。

背景資訊

802.11n產生的原因是對接入點幀聚合進行了大量更改：A-MPDU和A-MSDU。

- 塊確認大小
- MCS和通道繫結
- MIMO
- 在2.4 GHz上使用5 GHz:另外還提到Wi-Fi在5GHz上認證通道繫結

排除控制器11n速度的故障

請完成以下步驟：

1. 驗證控制器上是否已啟用802.11n支援。

```
(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. N速率有兩種方式。無需使用通道繫結即可達到調制編碼方案(MCS)7的速度。對於高於7且高達15的MCS速率，需要啟用通道繫結。您可以在控制器上使用以下**show**指令驗證是否已啟用通道粘合：

```
(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. 您也可以使用以下命令配置每個AP的通道寬度：

```
(WiSM-slot2-2) >config 802.11a disable AP0022.9090.8e97
(WiSM-slot2-2) >config 802.11a chan_width AP0022.9090.8e97 40
Set 802.11a channel width to 40 on AP AP0022.9090.8e97
```

4. Guard間隔和相應的MCS速率有助於確定802.11n客戶端上顯示的資料速率。以下是驗證此組態的命令：

```
(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
```

確保A-MPDU資料包聚合。為盡最大努力，可通過以下命令啟用QoS級別：**config 802.11a 11n支援a-mpdu tx priority 0 enableconfig 802.11b 11n支援a-mpdu tx priority 0 enable**

5. 必須使用A無線電上的所有三個天線。確保天線型號相同。
6. 在為客戶端連線配置的WLAN上，應該允許或需要WMM，且只能使用AES或開放加密。可以使用以下命令輸出驗證這一點：

```
(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. 天線分集：如果由於任何原因僅使用兩個天線，則需要對發射器/接收器埠使用天線A和B。

在客戶端：

1. 用於控制無線卡的請求方，首選將請求方的供應商與無線卡匹配。
2. 客戶端驅動程式：您需要確保無線卡上運行最新的客戶端驅動程式。
3. 請與無線介面卡供應商聯絡。
4. 確保使用11n認證介面卡來獲得11n資料速率。

Wi-Fi認證產品：

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

如何提高效能：

1. 通道利用率 — 網路分析器報告通道利用率，以傳送和接收幀所花費時間的百分比表示。這有助於測量由於距離接入點距離而產生的潛在速度差異。這將有助於監控和檢視通道是否完全被佔用，例如，在理想條件下以1Mbps的速率傳輸，在100%的利用率下將以0.94Mbps的速度執行。
2. 無線中使用的物理介質也決定了效能。使用802.11g或802.11a over 802.11b可提供高得多的吞吐量，通常在802.11b上最高可達30 mbps，其中6mpbs的無線電容量被分配給所有相關的站點。
3. 單元格大小 — 建議縮小單元格大小，以使客戶端儘可能靠近AP。這將有利於客戶端連線到AP的資料速率。這可以通過將AP上的電源級別降至最低來實現。
4. 縮小信元大小也能減少同通道干擾。如果使用RRM，AP應該根據部署動態選擇通道。但是，如果實施動態通道分配，請確保同一通道上不存在兩個功率級別較高的AP，並且這兩個接

入點彼此緊鄰在一起。
5. 保護也會導致吞吐量命中。

如何通過iPerf計算吞吐量

Iperf設定提示

對於不擁有Chariot的客戶或測試者，可以使用Iperf。可從 http://www.macalester.edu/crash/software/pc/iperf/kperf_setup.exe獲取該資訊。

測量TCP吞吐量

在伺服器端運行此命令：

```
Iperf –s -w 256k
```

在客戶端運行此命令：

```
Iperf –c -P 6 –w 256k -r –t 60
```

```
------------------------------------------------------------
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
```

此影象中的第一個圈數字表示上游吞吐量，第二個圈數字表示下游（AP到客戶端）吞吐量。

測量UDP吞吐量

關閉伺服器和客戶端上先前的Iperf應用程式。兩者都需要重新設定，但這次是為了進行UDP效能測試。

在伺服器端運行此命令：

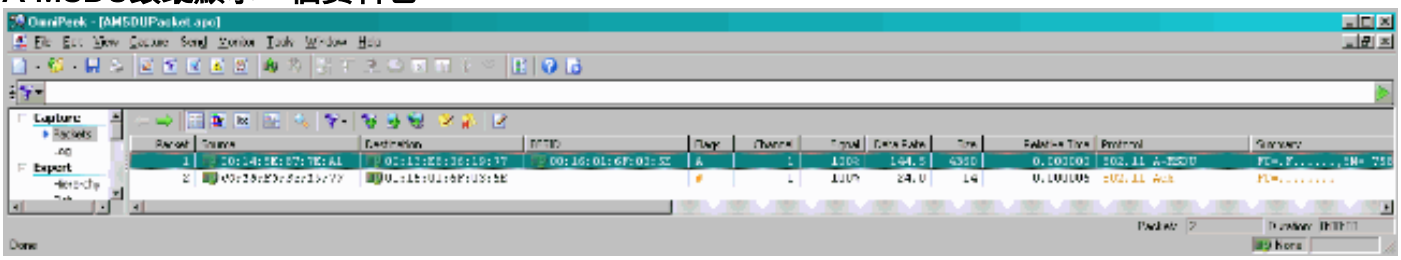
```
Iperf -s -u -l 56k
```

在客戶端運行此命令：

```
Iperf -c -u -b 50M -l 56k -P
```

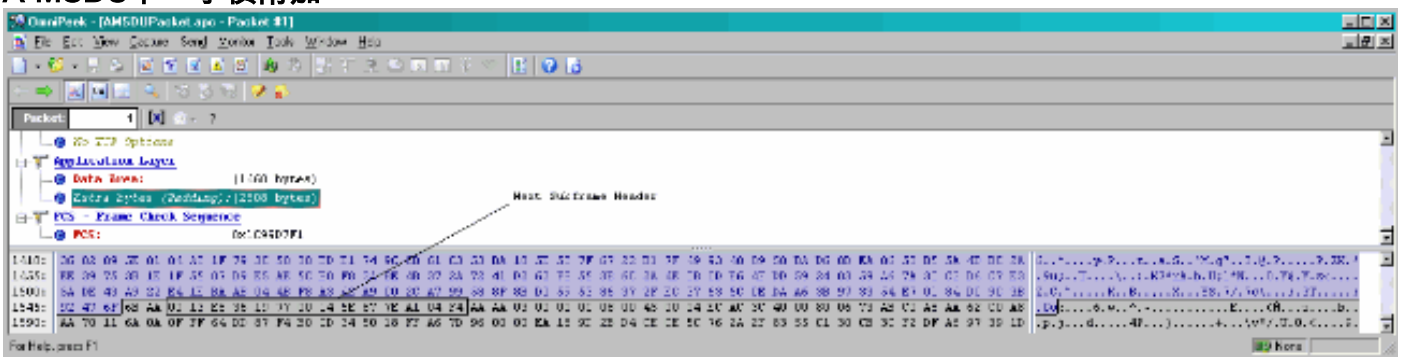
以下是Omnipeek捕獲分析聚合MAC服務資料單元的示例：

A-MSDU跟蹤顯示一個資料包

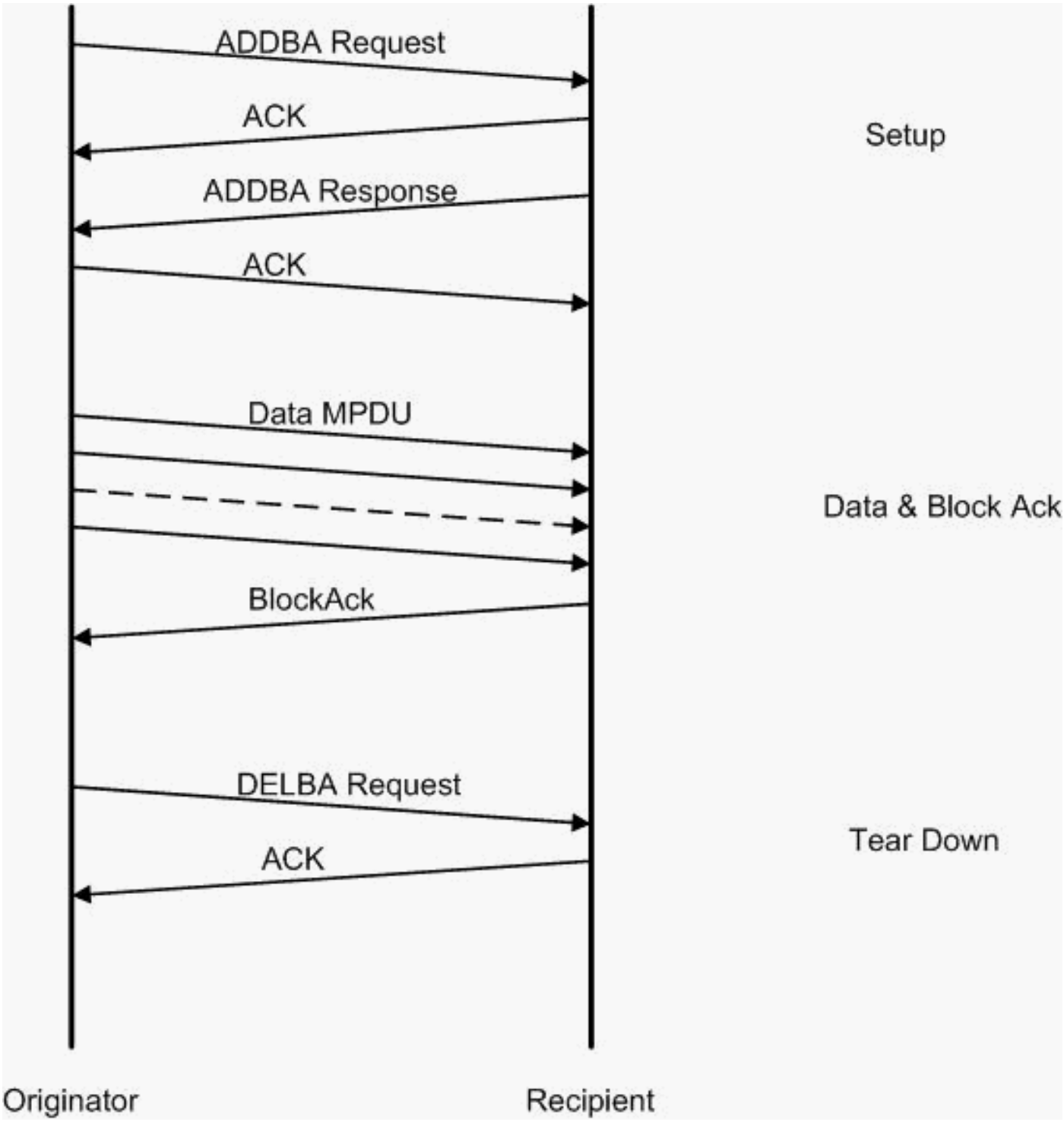


- 僅顯示第一個子幀。
- 需要檢查十六進位制轉儲以檢視其他子幀。

A-MSDU下一子幀附加

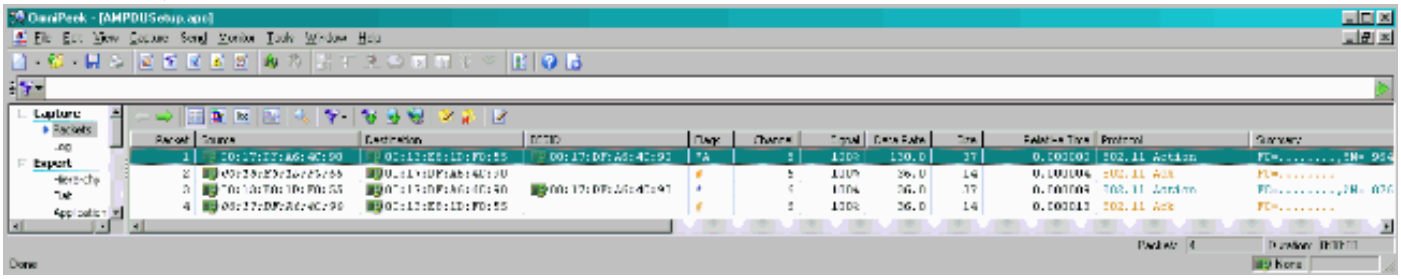


- A-MPDU是一種包含多個MPDU的結構，由PHY作為單個PSDU傳輸。
- 在物理層融合過程(PLCP)中指示資料包為資料A-MPDU。



以下是Omnipeek捕獲分析聚合MAC協**議資料單元的示例**:

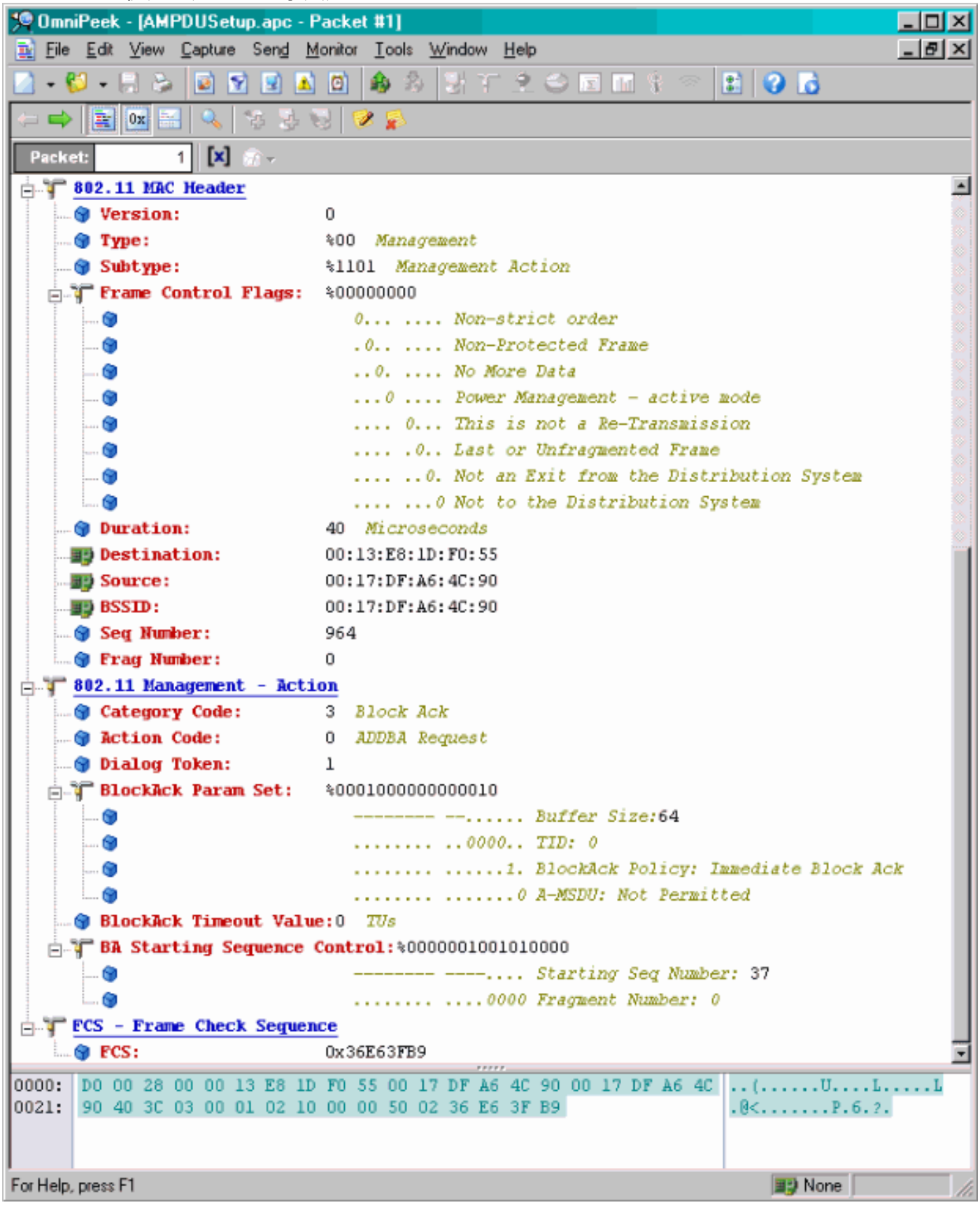
A-MPDU設定



- ADDBA — 新增塊確認
- ADDBA Request — 包含識別符號、塊確認策略、緩衝區大小等。
- ADDBA Response — 可以更改策略和緩衝區大小。

A-MPDU設定

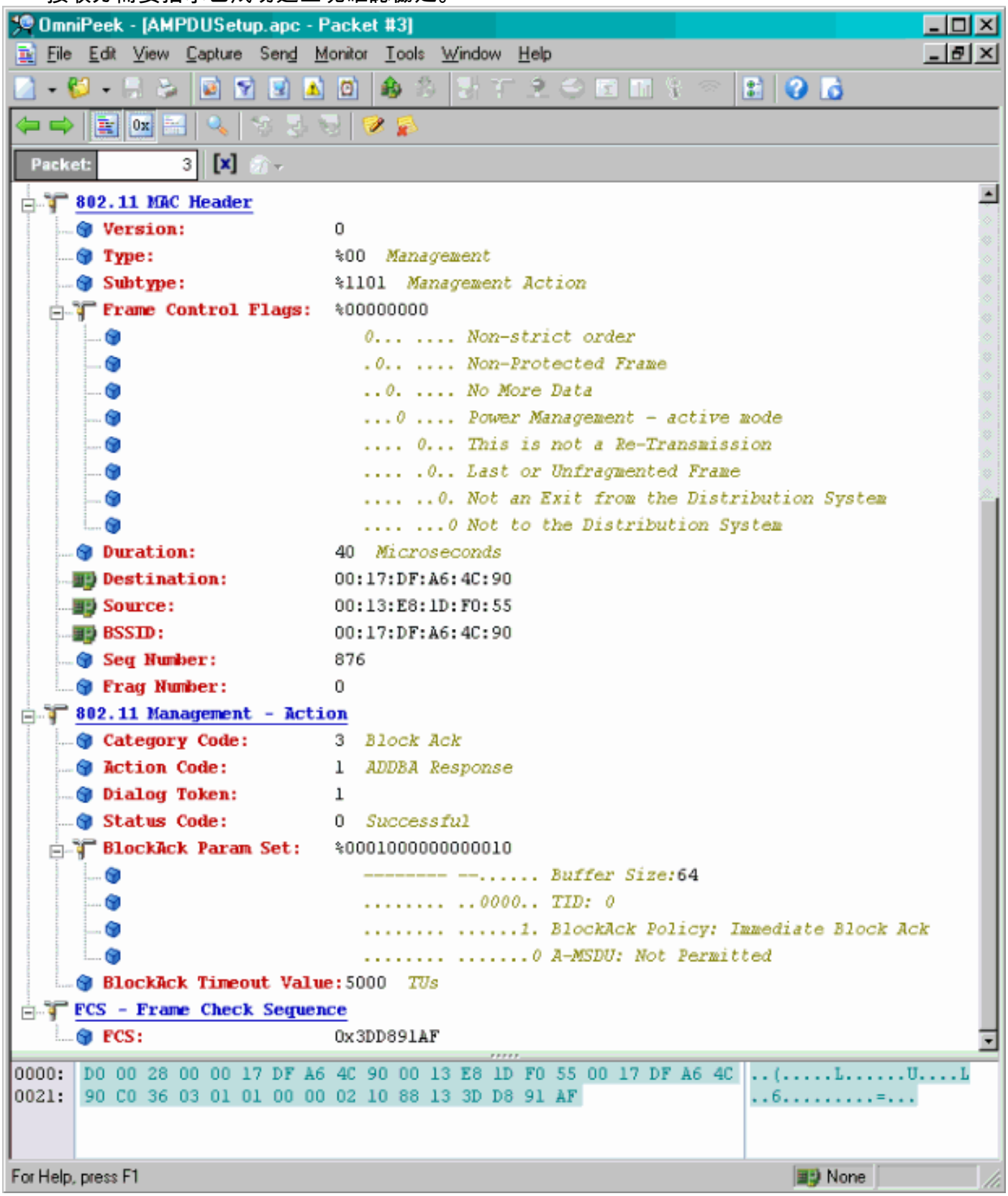
- ADDBA請求
- AP1250使用零超時來指示無超時。



A-MPDU設定

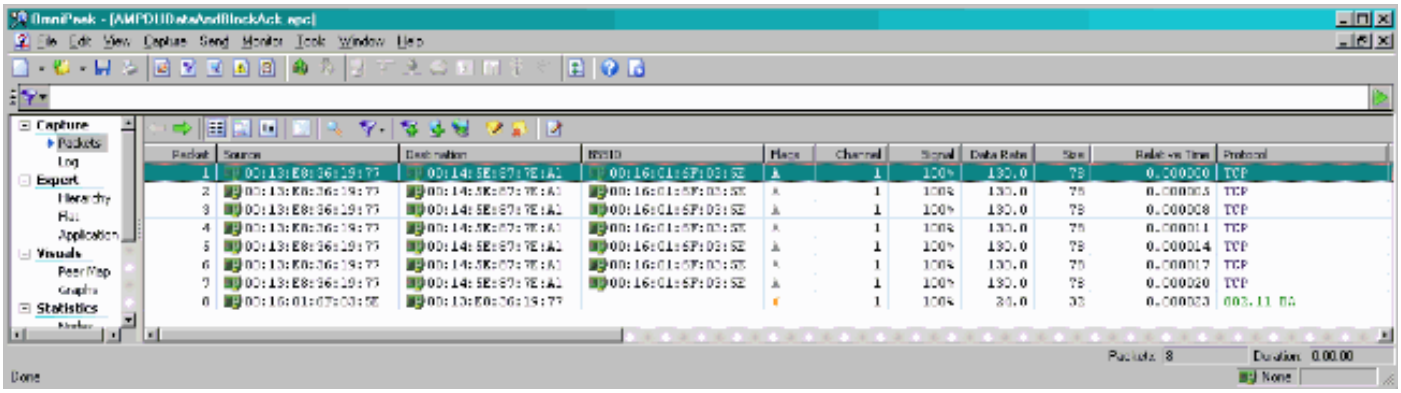
- ADDBA響應

- 接收方需要指示已成功建立塊確認協定。



A-MPDU資料傳輸

- 塊確認包含壓縮點陣圖，指示已接收的MPDU。
- 有關傳送塊確認的資訊，請參閱IEEE 802.11n第9.10.7節「HT-immediate Block Ack extensions」。



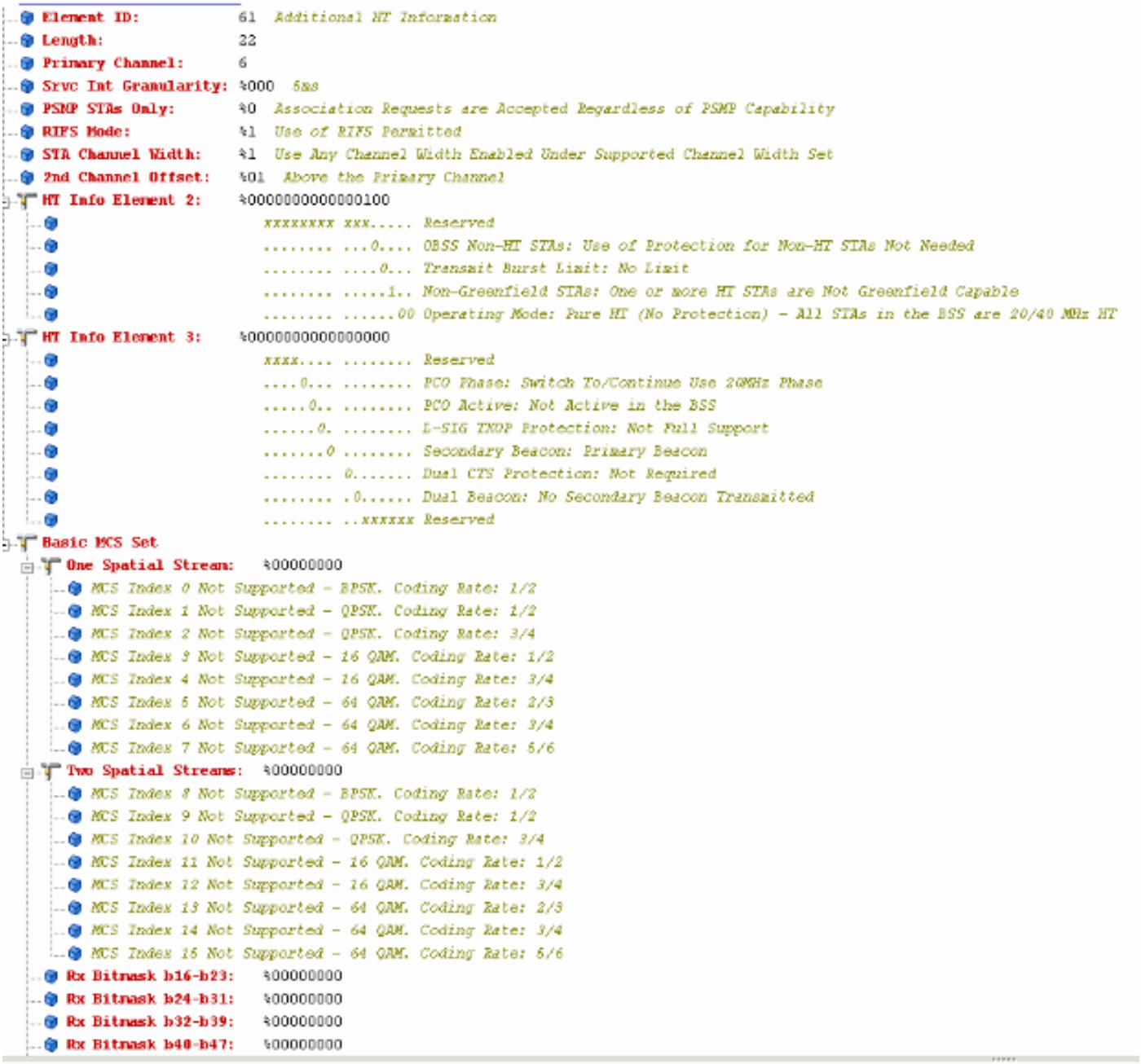
信標中通告的功能

- 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 PPDUs 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

信標中通告的功能：

```
Rx Bitmask b64-b76:    %00000000000000
Reserved:              %000
Highest Supported Rate:0  Mbps
Reserved:              %000000
Tx Supported MCS Set: %0  Not Defined
Tx and Rx MCS Set:     %0  Equal
Tx Maximum Number Spatial Streams Supported:%00  1 Spatial Stream
Tx Unequal Modulation:%0  Not Supported
Reserved:              %00000000000000000000000000000000  b101-b127
HT Extended Capabilities Info:%0000000000000000
                       xxxx .... .... .... Reserved
                       .... 0... .... .... Reverse Direction Responder: Supported
                       .... .0.. .... .... +HTC Support: Supported
                       .... ..00 .... .... MCS Feedback: STA Does Not Provide MCS Feedback
                       .... .... xxxx x... Reserved
                       .... .... .... .00. Transition Time: No Transition
                       .... .... .... ...0 Transmitter Supports PCO: Supported
Tx Beam Forming Capability (TxBF):%00000000000000000000000000000000
                       xxx. .... .... .... .... .... .... .... Reserved
                       ...0 0... .... .... .... .... .... .... Channel Estimation Capability: 1 Space Time Stream
                       .... .00. .... .... .... .... .... .... CSI Max Number of Rows: 1 Row of CSI
                       .... ...0 0... .... .... .... .... .... Compressed BF Feedback Matrix: 1 TX Antenna Sounding
                       .... .... .00. .... .... .... .... .... Uncompressed BF Feedback Matrix: 1 TX Antenna Sounding
                       .... .... ...0 0... .... .... .... .... CSI Number of BF Antennas: 1 TX Antenna Sounding
                       .... .... .... .00. .... .... .... .... Minimal Grouping: STA Supports Groups of 1 (No Grouping)
                       .... .... .... ...0 0... .... .... .... Compressed BF Feedback Matrix: Not Supported
                       .... .... .... .... .00. .... .... .... Uncompressed BF Feedback Matrix: Not Supported
                       .... .... .... .... ...0 0... .... .... TxBF CSI Feedback: Not Supported
                       .... .... .... .... .... .0.. .... .... Compressed BF Feedback Matrix Capable: Not Supported
                       .... .... .... .... .... ..0. .... .... Uncompressed BF Feedback Matrix: Not Supported
                       .... .... .... .... .... ...0 .... .... Explicit CSI TxBF Capable: Not Supported
                       .... .... .... .... .... .... 00.. .... Calibration: Not Supported
                       .... .... .... .... .... .... ..0. .... Implicit TxBF Capable: Not Supported
                       .... .... .... .... .... .... ...0 .... Tx NDP Capable: Not Supported
                       .... .... .... .... .... .... .... 0... Rx NDP Capable: Not Supported
                       .... .... .... .... .... .... .... .0.. Tx Staggered Sounding Capable: Not Supported
                       .... .... .... .... .... .... .... ..0. Rx Staggered Sounding Capable: Not Supported
                       .... .... .... .... .... .... .... ...0 Implicit TxBF Receiving Capable: Not Supported
Antenna Selection Capability (ASEL):%00000000
                       x... .... Reserved
                       .0.. .... Tx Sounding PPDUs Capable: Not Supported
                       ..0. .... Rx ASEL Capable: Not Supported
                       ...0 .... Antenna Indices Feedback Capable: Not Supported
                       .... 0... Explicit CSI Feedback: Tx AS Capable: Not Supported
                       .... .0.. Antenna Indices Feedback Based Tx ASEL Capable: Not Supported
                       .... ..0. Re-Explicit CSI Feedback Tx ASEL Capable: Not Supported
```

信標中通告的功能：



與為A-MPDU新增塊確認設定的關聯相似：

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	WLCCP	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

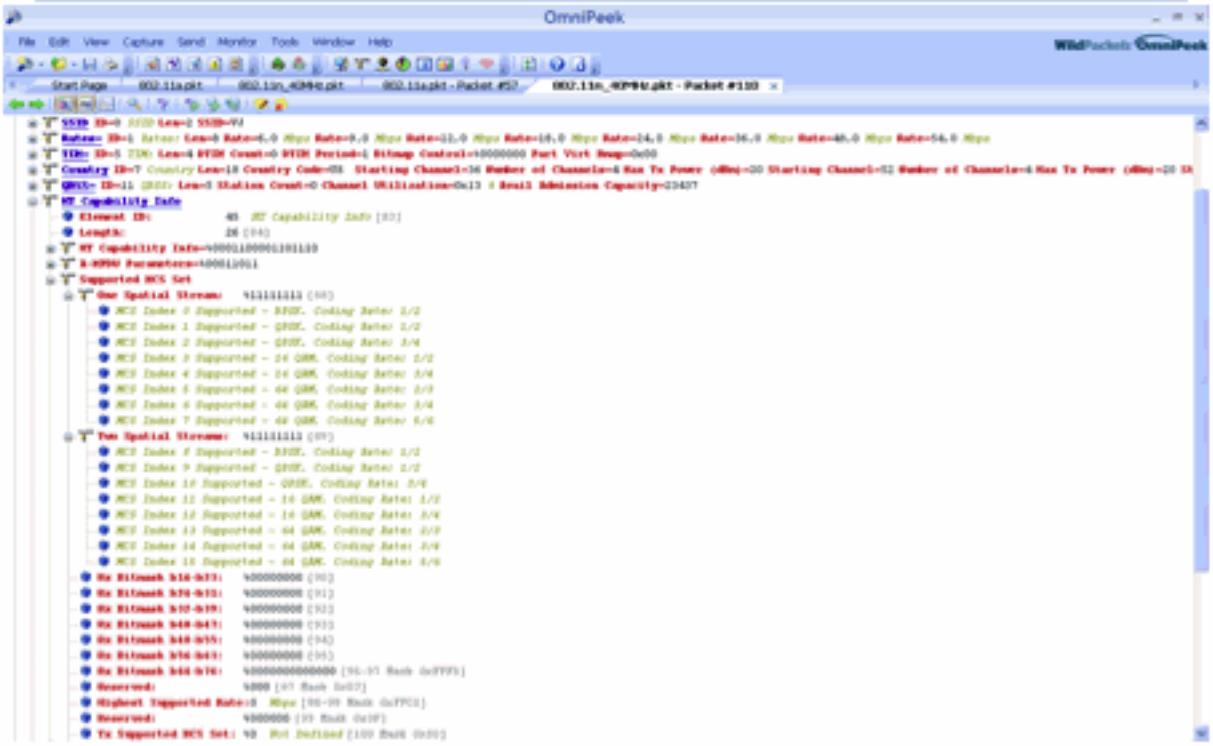
Above is a beacon frame from an SSID enabled for n rates

- ********** **Showing the channel Width to be 40MHz** **********

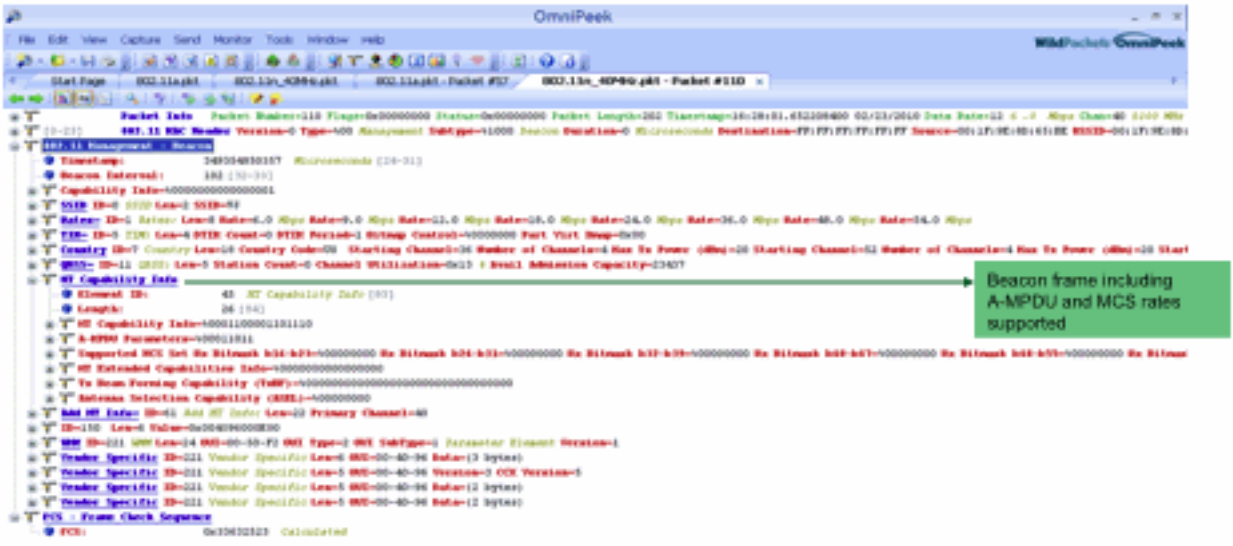
- interface Dot11Radio1
- Radio AIR-RM1252A, Base Address 001f.9ea6.8520, BBlock version 0.00, Software version 2.10.20
- Serial number: FOC1212405A
- Number of supported simultaneous BSSID on Dot11Radio1: 16
- Carrier Set: Americas (OFDM) (US) (-A)
- Uniform Spreading Required: Yes
- **Configured Frequency: 5180 MHz Channel 36 40MHz, extended above**
- Allowed Frequencies: 5180(36) 5200(40) 5220(44) 5240(48) *5260(52) *5280(56) *5300(60) *5320(64) *5500(100) *5520(104) *5540(108) *5560(112) *5580(116) *5660(132) *5680(136) *5700(140) 5745(149) 5765(153) 5785(157) 5805(161) 5825(165)
- * = May only be selected by Dynamic Frequency Selection (DFS)
- Listen Frequencies: 5180(36) 5200(40) 5220(44) 5240(48) 5260(52) 5280(56) 5300(60) 5320(64) 5500(100) 5520(104) 5540(108) 5560 (112) 5580(116) 5660(132) 5680(136) 5700(140) 5745(149) 5765(153) 5785(157) 5805(161) 5825(165)
- Beacon Flags: 0, Interface Flags 20105: Beacons are enabled; Probes are enabled
- Configured Power: 14 dBm (level 1)
- Active power levels by rate
- 6.0 to 54.0 , 14 dBm
- 6.0-bf to 54.0-b, 8 dBm, changed due to regulatory maximum
- m0. to m15.-4, 11 dBm, changed due to regulatory maximum
- OffChnl Power: 14, Rate 6.0
- --More-- Allowed Power Levels: -1 2 5 8 11 14
- --More-- Allowed Client Power Levels: 2 5 8 11 14
- Receive Antennas : right-a left-b middle-c
- Transmit Antennas : right-a left-b, oldm single
- Antenna: external, Gain: Allowed 11, Reported 0, Configured 0, In Use 11
- Active Rates: basic-6.0 9.0 basic-12.0 18.0 basic-24.0 36.0 48.0 54.0
- Current Rates: basic-6.0 9.0 basic-12.0 18.0 basic-24.0 36.0 48.0 54.0
- Allowed Rates: 6.0 9.0 12.0 18.0 24.0 36.0 48.0 54.0
- All Rates: 6.0 9.0 12.0 18.0 24.0 36.0 48.0 54.0 m0. m1. m2. m3. m4. m5. m6. m7. m8. m9. m10. m11. m12. m13. m14. m15.
- **Default Rates: basic-6.0 9.0 basic-12.0 18.0 basic-24.0 36.0 48.0 54.0 m0. m1. m2. m3. m4. m5. m6. m7. m8. m9. m10. m11. m12. m13. m14. m15.**
- **Best Range Rates: basic-6.0 9.0 12.0 18.0 24.0 36.0 48.0 54.0 m0. m1. m2. m3. m4. m5. m6. m7. m8. m9. m10. m11. m12. m13. m14. m15.**
- **Best Throughput Rates: basic-6.0 basic-9.0 basic-12.0 basic-18.0 basic-24.0 basic-36.0 basic-48.0 basic-54.0 m0. m1. m2. m3. m4. m5. m6. m7. m8. m9. m10. m11. m12. m13. m14. m15.**

MCS Rates on 802.11n beacon

Supported MCS rates



802.11a with N rates Enabled



802.11A Beacon frame

相關資訊

- 技術支援與文件 - Cisco Systems