

Comprensión del cliente del debug en los reguladores del Wireless LAN (WLCs)

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[Introducción](#)

Este documento proporciona información detallada sobre la salida del comando del cliente de debug en los controladores de LAN inalámbricos.

Este documento abarca estos temas:

- Cómo manejan a un cliente de red inalámbrica
- Resolver problemas los problemas básicos de la asociación y de la autenticación

La salida que se analizará cubre el escenario para una red de la clave previamente compartida WPA (WPA-PSK).

[prerrequisitos](#)

[Requisitos](#)

Cisco recomienda que tenga conocimiento sobre estos temas:

- Cómo configurar el regulador del Wireless LAN (WLC) y el Lightweight Access Point (REVESTIMIENTO) para la operación básica
- Métodos del protocolo (LWAPP) y de la seguridad de red inalámbrica del Lightweight Access Point
- Cómo la autenticación del 802.11 y el trabajo de procesos de asociación

Componentes Utilizados

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

- WLC de las 2000/2100/4400 Series de Cisco que funciona con el firmware 4.1 o 4.2
- Puntos de acceso Lwapp-basados

La información que contiene este documento se creó a partir de los dispositivos en un ambiente de laboratorio específico. Todos los dispositivos que se utilizan en este documento se pusieron en funcionamiento con una configuración verificada (predeterminada). Si la red está funcionando, asegúrese de haber comprendido el impacto que puede tener cualquier comando.

Convenciones

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

Haga el debug de al cliente

El cliente del comando debug <MACADDRESS > es una macro que habilita ocho comandos debug, más un filtro en la dirección MAC proporcionada, tan solamente los mensajes se muestran que contienen el MAC Address especificado. Los ocho comandos debug muestran los detalles más importantes en la asociación del cliente y la autenticación. El filtro ayuda con las situaciones donde hay clientes de red inalámbrica múltiples. Las situaciones por ejemplo cuando se genera demasiada salida o el regulador se sobrecarga cuando el hacer el debug de se habilita sin el filtro.

Los detalles importantes de las cubiertas de la información recopilada sobre la asociación del cliente y la autenticación (con dos excepciones mencionadas más adelante en este documento).

Los comandos se habilitan que se muestran en esta salida:

```
(Cisco Controller) >show debug
```

```
MAC address ..... 00:00:00:00:00:00
```

```
Debug Flags Enabled:
```

```
dhcp packet enabled.  
dot11 mobile enabled.  
dot11 state enabled.  
dot1x events enabled.  
dot1x states enabled.  
pem events enabled.
```

pem state enabled.

Estos comandos cubren la negociación de dirección, la máquina de estado del cliente del 802.11, la autenticación del 802.1x, el módulo de la aplicación de políticas (PEM), y el (DHCP) de la negociación de dirección.

Variaciones del cliente del debug

Para la mayoría de los escenarios, los **<MACAddress >** el comando del **cliente del debug** es bastantes para conseguir la información necesitada. Sin embargo, aquí están dos situaciones importantes donde está necesario el debugging adicional:

- [Movilidad](#) (cliente que vaga por entre los reguladores)
- [Troubleshooting de la autenticación EAP](#)

Movilidad

En esta situación, necesidad de los debugs de la movilidad de ser habilitado después de que los **<MACAddress >** el comando del **cliente del debug** se haya introducido para ganar la información adicional en la interacción del protocolo de la movilidad entre los reguladores.

Note: Los detalles en esta salida serán cubiertos en los documentos futuros.

Para habilitar los debugs de la movilidad, utilice los **<MACAddress del cliente del debug >**, y después utilice el **comando enable de las manos de la movilidad del debug**:

```
(Cisco Controller) >debug client 00:00:00:00:00:00
(Cisco Controller) >debug mobility handoff enable
(Cisco Controller) >show debug
MAC address ..... 00:00:00:00:00:00
Debug Flags Enabled:
  dhcp packet enabled.
  dot11 mobile enabled.
  dot11 state enabled
  dot1x events enabled.
  dot1x states enabled.
  mobility handoff enabled.
  pem events enabled.
  pem state enabled.
```

Troubleshooting de la autenticación EAP

Para resolver problemas la interacción entre el WLC y el servidor de autenticación (externo RADIUS o servidor interno EAP), utilice el comando debug aaa all enable, que muestra los detalles requeridos. Este comando se debe utilizar después de que los **<MACAddress >** el comando del **cliente del debug** y se puede combinar con los otros comandos de debug según las necesidades (por ejemplo, las **manos**).

```
(Cisco Controller) >debug client 00:00:00:00:00:00
(Cisco Controller) >debug aaa all enable
(Cisco Controller) >show debug
MAC address ..... 00:00:00:00:00:00
Debug Flags Enabled:
  aaa detail enabled.
  aaa events enabled.
  aaa packet enabled.
  aaa packet enabled.
  aaa ldap enabled.
  aaa local-auth db enabled.
  aaa local-auth eap framework errors enabled.
  aaa local-auth eap framework events enabled.
  aaa local-auth eap framework packets enabled.
  aaa local-auth eap framework state machine enabled.
  aaa local-auth eap method errors enabled.
  aaa local-auth eap method events enabled.
  aaa local-auth eap method packets enabled.
  aaa local-auth eap method state machine enabled.
  aaa local-auth shim enabled.
  aaa tacacs enabled.
  dhcp packet enabled.
  dot11 mobile enabled.
  dot11 state enabled
  dot1x events enabled
  dot1x states enabled.
  mobility handoff enabled.
  pem events enabled.
  pem state enabled.
```

Conexión cliente

Con el propósito de este documento, la *conexión cliente* es el proceso para que un cliente de red inalámbrica pase con estos pasos:

Sección del 802.11

1. El sondear, para encontrar un AP válido para asociarse.
2. Autenticación: Puede estar abierto (falta de información) o compartió. Normalmente, se selecciona Open.
3. Asociación: Pedir los servicios de datos al AP.

Sección de las directivas L2

1. Ninguno; El PSK o la autenticación EAP ocurre dependiendo de la configuración.
2. Negociación dominante, si se selecciona un método de encriptación.

Sección de las directivas L3

1. Aprendizaje de dirección.
2. Autenticación Web, si está seleccionado.

Note: Estos pasos representan un subconjunto o un resumen del proceso completo. Este documento describe un escenario simplificado que cubra el 802.11 y las directivas L2 y utilice el WPA-PSK, más el aprendizaje de dirección. No se utiliza ningunas directivas AAA o L3 del externo para la autenticación.

Procesos del controlador

En cada sección, el regulador utiliza los procesos separados para no perder de vista el estado del cliente en cada momento. Los procesos obran recíprocamente entre ellos para asegurarse de que agregan al cliente a la tabla de conexiones (por las políticas de seguridad configuradas). Para entender los pasos de la conexión cliente al regulador, aquí es un resumen corto de los procesos más relevantes:

- **Módulo de la aplicación de políticas (PEM)** — Controla al estado del cliente y lo fuerza con cada uno de las políticas de seguridad en la configuración de la red inalámbrica (WLAN).
- **Funciones del Punto de acceso (APF)** — Básicamente, la máquina de estado del 802.11.
- **Dot1x** — Implementa la máquina de estado para el 802.1x, la autenticación del PSK, y la clave que dirige para los clientes de red inalámbrica.
- **Movilidad** — Sigue la interacción con otros reguladores en el mismo grupo de la movilidad.
- **Capa de la transformación de datos (DTL)** — Se sienta entre los componentes del software y la aceleración del hardware de red (NPU); controla la información ARP.

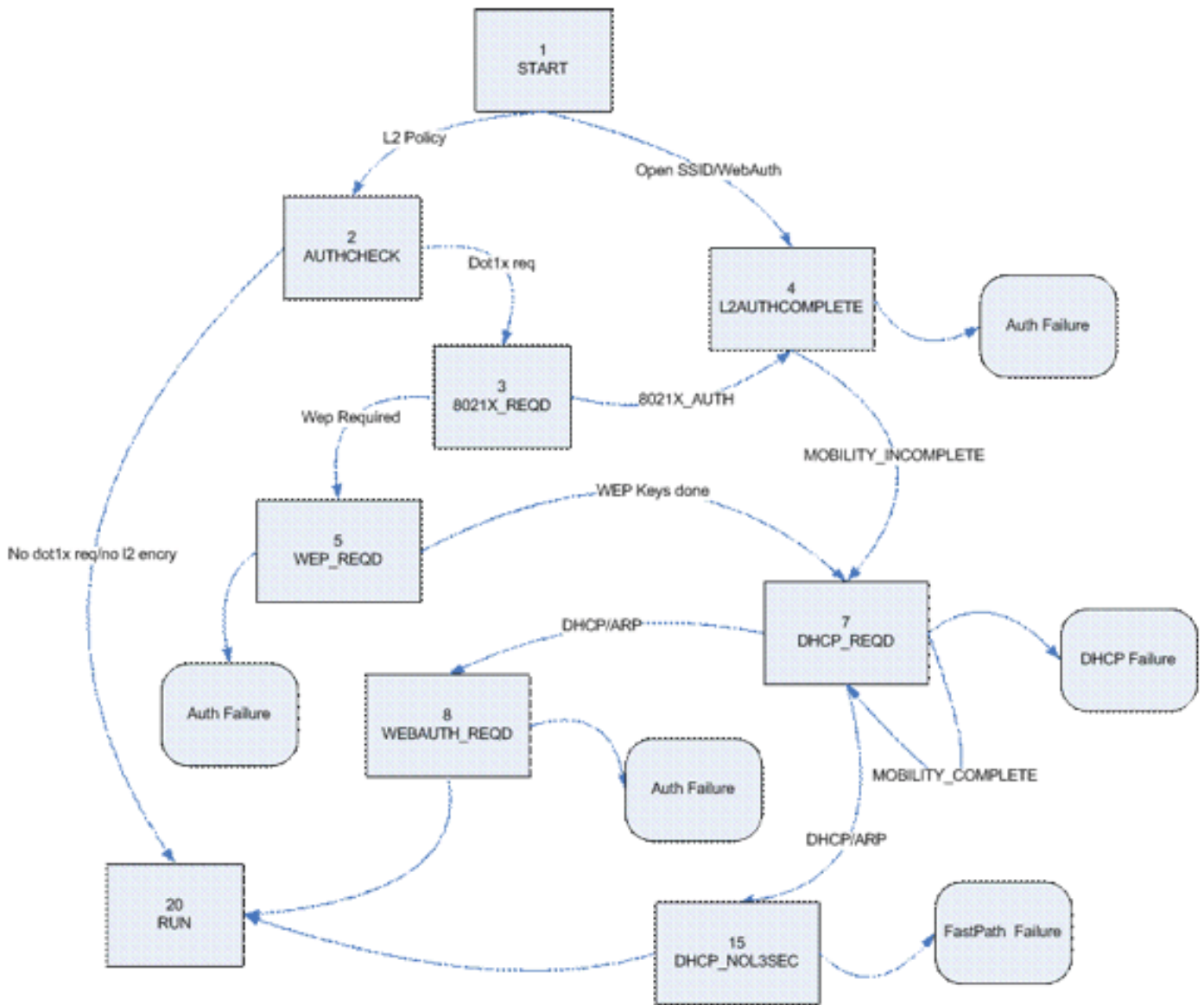
[Módulo de la aplicación de políticas \(PEM\)](#)

De acuerdo con la configuración de la red inalámbrica (WLAN), el cliente pasa con una serie de pasos. El PEM se asegura que éste esté hecho para que cumpla con las políticas de seguridad requeridas L2 y L3.

Aquí está un subconjunto de los estados PEM relevantes para el análisis de un debug del cliente:

- **COMIENZO** — Estatus inicial para la nueva entrada del cliente.
- **AUTHCHECK** — La red inalámbrica (WLAN) tiene una política de autenticación L2 a aplicar.
- **8021X_REQD** — El cliente debe completar la autenticación del 802.1x.
- **L2AUTHCOMPLETE** — El cliente ha acabado con éxito la directiva L2. El proceso puede ahora proceder a las directivas L3 (aprendizaje de dirección, auth de la red, etc). El regulador envía aquí el aviso de la movilidad para aprender la información L3 de otros reguladores si esto es un cliente de itinerancia en el mismo grupo de la movilidad.
- **WEP_REQD** — El cliente debe completar la autenticación WEP.
- **DHCP_REQD** — El regulador necesita aprender el direccionamiento L3 del cliente, que es hecho por el pedido ARP, pedido de DHCP o renueva, o por la información aprendida del otro regulador en el grupo de la movilidad. Si el DHCP requerido se marca en la red inalámbrica (WLAN), sólo se utiliza el DHCP o la información de la movilidad.
- **WEBAUTH_REQD** — El cliente debe completar la autenticación Web. (Directiva L3)
- **EJECÚTESE** — El cliente ha completado con éxito las directivas requeridas L2 y L3 y puede ahora transmitir el tráfico a la red.

Esta figura muestra una máquina de estado simplificada PEM con las transiciones del cliente hasta que alcance el estado de FUNCIONAMIENTO, donde el cliente puede ahora enviar el tráfico a la red:



Note: Esta figura no cubre todas las transiciones y estados posibles. Algunos pasos intermedios se han quitado para mayor claridad.

Reenvío de tráfico del cliente

Entre el estado del COMIENZO y antes del estado de FUNCIONAMIENTO final, el tráfico del cliente no se remite a la red, sino se pasa a la CPU principal en el regulador para el análisis. La información se remite que depende del estado y de las directivas en el lugar; por ejemplo, si se habilita el 802.1x, el tráfico EAPOL se remite al CPU. Otro ejemplo es si se utiliza el auth de la red, después el HTTP y el DNS es permitido e interceptado por el CPU para hacer el cambio de dirección de la red y obtener las credenciales de la autenticación de cliente.

Cuando el cliente alcanza el estado de FUNCIONAMIENTO, la información del cliente se envía al NPU para habilitar el fastpath que conmuta, que hace un envío de la cable-tarifa del tráfico de usuarios al VLA N del cliente y libera la CPU central de las tareas de la expedición de los datos del usuario.

El tráfico se remite que depende del tipo de cliente que se aplica al NPU. Esta tabla describe los tipos más relevantes:

Tip	Descripción
-----	-------------

0	
1	Reenvío de tráfico normal del cliente.
9	Estado de aprendizaje IP. Un paquete de este cliente se envía al CPU para aprender la dirección IP usada.
2	Paso ACL. Utilizado cuando la red inalámbrica (WLAN) es un ACL configurado para informar al NPU.

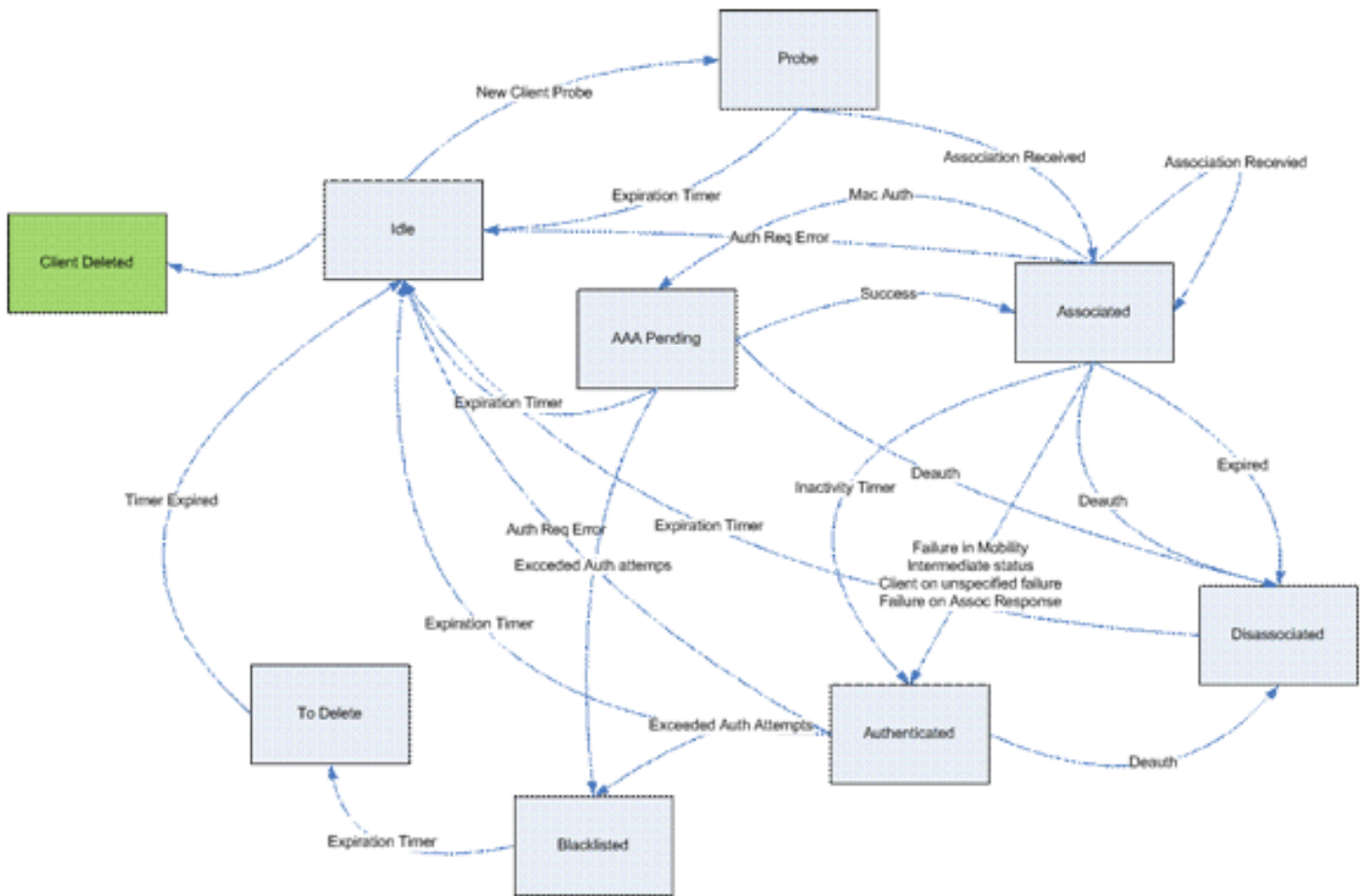
[El Punto de acceso funciona \(la APF\)](#)

Este proceso maneja el estado del cliente a través del estado de la máquina del 802.11 y obra recíprocamente con el código de la movilidad para validar los diversos escenarios de itinerancia. Este documento no cubre los detalles de la movilidad o sus estados.

La tabla siguiente muestra a los estados del cliente más relevantes que se ingresan adentro durante una asociación del cliente al regulador:

Nombre	Descripción
Inactivo	Nuevo cliente o estado temporario en algunas situaciones.
AAA pendiente	Autenticación de la dirección MAC del cliente que espera para.
Autenticado	Autenticación abierta acertada o estado intermedio en algunas situaciones.
Asociado	Auth con éxito pasajero del cliente MAC y procesos abiertos del auth.
Desasociado	Cliente la desasociación/el deauthentication enviados temporizador, o de la asociación expiró.
Para borrar	Cliente marcado para ser borrado (después del temporizador de la exclusión expiró normalmente).
Sonda	Petición de la sonda recibida para el nuevo cliente.
Excluido/puesto	Han marcado al cliente como excluido. Relacionado normalmente con las directivas WPS.
No válido	Error en el estado del cliente.

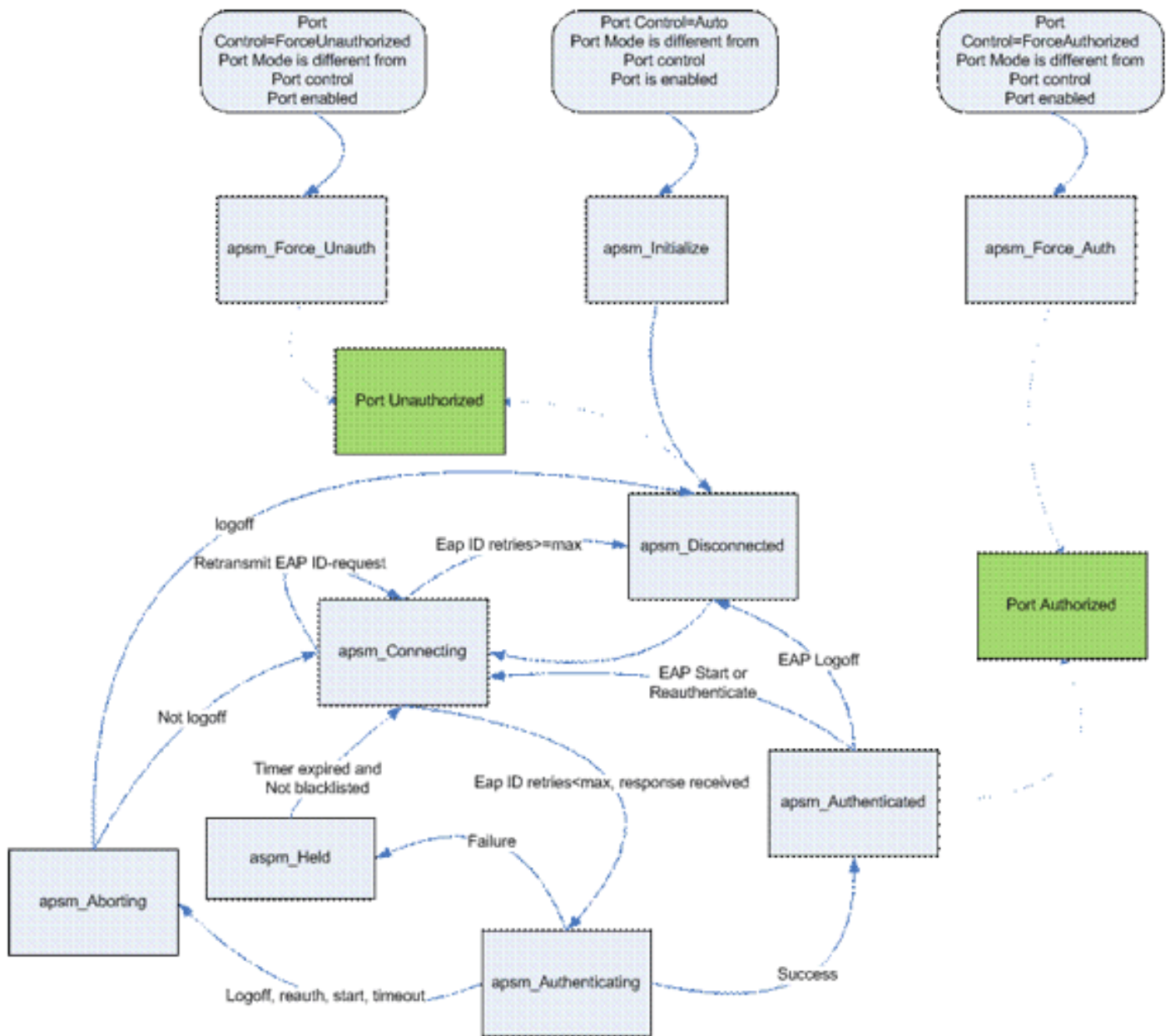
Esta figura representa una transición de la máquina de estado y muestra solamente la mayoría de los estados pertinentes y de las transiciones:



autenticación del 802.1x (dot1x)

El proceso del dot1x es responsable de la autenticación y de la administración de claves del 802.1x para el cliente. Esto significa que, incluso en los WLAN que no tienen una directiva EAP que requiere el 802.1x, el dot1x participa para manejar la creación y la negociación dominantes con el cliente y también para la dirección ocultada de la clave (PMK o CCKM).

Esta máquina de estado muestra las transiciones completas del 802.1x:



Análisis del cliente del debug

APF Process

Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 Adding mobile on LWAPP AP
00:1c:0j:ca:5f:c0(0)

!--- A new station is received. After validating type, it is added to the !--- AP that received it. This can happen both on processing association !--- request or probe requests Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 23) in 5 seconds !--- Sets an expiration timer for this entry in case it does not progress !--- beyond probe status. 5 Seconds corresponds to Probe Timeout. This message !--- might appear with other time values since, during client processing, !--- other functions might set different timeouts depending on state. Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 apfProcessProbeReq (apf_80211.c:4057) Changing state for mobile 00:1b:77:42:07:69 on AP 00:1c:0j:ca:5f:c0 from Idle to Probe !--- APF state machine is updated. Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds !--- New Probe request update sent AP about client. IMPORTANT: !--- Access points do not forward all probe requests to the controller; they !--- summarize per time interval (by default 500 msec). This information is !--- used later by location and load balancing processes. Wed Oct 31 10:46:14 2007:

00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds !--- *New Probe request update sent AP about client.* Wed Oct 31 10:46:14 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds !--- *New Probe request update sent AP about client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds !--- *New Probe request update sent AP about client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Association received from mobile on AP 00:1c:0j:ca:5f:c0 !--- *Access point reports an association request from the client. !--- When the process reaches this point, the client is not excluded and not !--- in mobility intermediate state* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 STA - rates (8): 140 18 152 36 176 72 96 108 0 0 0 0 0 0 0 0 !--- *Controller saves the client supported rates into its connection table. !--- Units are values of 500 kbps, basic (mandatory) rates have the Most Significant bit (MSb) set. !--- The above would be 6mbps basic, 9, 12 basic, 18, 24 basic, 36, 48, 54* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Processing WPA IE type 221, length 24 for mobile 00:1b:77:42:07:69 !--- *Controller validates the 802.11i security information element. PEM Process*

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 START (0) Deleted mobile LWAPP rule on AP [00:1c:0j:ca:5f:c0] !--- *As the client requests new association, APF requests to PEM to delete the !--- client state and remove any traffic forwarding rules that it could have. APF Process*

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Updated location for station old AP 00:00:00:00:00:00-0, new AP 00:1c:0j:ca:5f:c0-1 !--- *APF updates where this client is located. For example, this client is !--- a new addition; therefore, no value exists for the old location.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 START (0) Initializing policy !--- *PEM notifies that this is a new user. Security policies are checked !--- for enforcement. PEM Process*

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 START (0) Change state to AUTHCHECK (2) last state AUTHCHECK (2) !--- *PEM marks as authentication check needed.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 AUTHCHECK (2) Change state to 8021X_REQD (3) last state 8021X_REQD !--- *After the WLAN configuration is checked, the client will need either !--- 802.1x or PSK authentication* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 8021X_REQD (3) Plumbed mobile LWAPP rule on AP 00:1c:0j:ca:5f:c0 !--- *PEM notifies the LWAPP component to add the new client on the AP with !--- a list of negotiated capabilities, rates, Qos, etc. APF Process*

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 apfPemAddUser2 (apf_policy.c:209) Changing state for mobile 00:1b:77:42:07:69 on AP 00:1c:0j:ca:5f:c0 from Probe to Associated !--- *APF notifies that client has been moved successfully into associated !--- state.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Stopping deletion of Mobile Station: (callerId: 48) !--- *The expiration timer for client is removed, as now the session timeout !--- is taking place. This is also part of the above notification !--- (internal code callerId: 48).* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Sending Assoc Response to station on BSSID 00:1c:0j:ca:5f:c0 (status 0) !--- *APF builds and sends the association response to client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 apfProcessAssocReq (apf_80211.c:3838) Changing state for mobile 00:1b:77:42:07:69 on AP 00:1c:0j:ca:5f:c0 from Associated to Associated !--- *The association response was sent successfully; now APF keeps the !--- client in associated state and sets the association timestamp on this point. Dot1x Process*

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Creating a new PMK Cache Entry for station 00:1b:77:42:07:69 (RSN 0) !--- *APF calls Dot1x to allocate a new PMK cached entry for the client. !--- RSN is disabled (zero value).* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Initiating WPA PSK to mobile 00:1b:77:42:07:69 !--- *Dot1x signals a new WPA or WPA2 PSK exchange with mobile.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 dot1x - moving mobile 00:1b:77:42:07:69 into Force Auth state !--- *As no EAPOL authentication takes place, the client port is marked as !--- forced Auth. Dot1x performs key negotiation with PSK clients only.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Skipping EAP-Success to mobile 00:1b:77:42:07:69 !--- *For PSK, CCKM or RSN,*

the EAP success is not sent to client, as there !--- was no EAPOL authentication taking place.
Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Sending EAPOL-Key Message to mobile
00:1b:77:42:07:69 state INITPMK (message 1), replay counter 00.00.00.00.00.00.00.00 !--- *Dot1x starts the exchange to arrive into PTK. PMK is known, as this !--- is PSK auth. First message is ANonce.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-Key from mobile
00:1b:77:42:07:69 !--- *Message received from client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-key in PKT_START state (message 2) from mobile 00:1b:77:42:07:69 !--- *This signals the start of the validation of the second message !--- from client (SNonce+MIC). No errors are shown, so process continues. !--- Potential errors at this point could be: deflection attack (ACK bit !--- not set on key), MIC errors, invalid key type, invalid key length, etc.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Stopping retransmission timer for mobile
00:1b:77:42:07:69 !--- *Dot1x got an answer for message 1, so retransmission timeout is stopped.*
Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Sending EAPOL-Key Message to mobile
00:1b:77:42:07:69 state PTKINITNEGOTIATING (message 3), replay counter 00.00.00.00.00.00.00.01 !--- *Derive PTK; send GTK + MIC.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-Key from mobile 00:1b:77:42:07:69 !--- *Message received from client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-key in PTKINITNEGOTIATING state (message 4) from mobile 00:1b:77:42:07:69 !--- *This signals the start of validation of message 4 (MIC), which !--- means client installed the keys. Potential errors after this message !--- are MIC validation errors, invalid key types, etc.* **PEM Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 8021X_REQD (3) Change state to L2AUTHCOMPLETE (4) last state L2AUTHCOMPLETE (4)
!--- *PEM receives notification and signals the state machine to change to L2 !--- authentication completed.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 L2AUTHCOMPLETE (4) Plumbed mobile LWAPP rule on AP 00:1c:0j:ca:5f:c0 !--- *PEM pushes client status and keys to AP through LWAPP component.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 L2AUTHCOMPLETE (4) Change state to DHCP_REQD (7) last state DHCP_REQD (7) !--- *PEM sets the client on address learning status.*
Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) pemAdvanceState2 4238, Adding TMP rule !--- *PEM signals NPU to allow DHCP/ARP traffic to be inspected by controller !--- for the address learning.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Adding Fast Path rule type = Airespace AP - Learn IP address on AP 00:1c:0j:ca:5f:c0, slot 1, interface = 1, QOS = 0 ACL Id = 255, Jumbo Frames = NO, 802.1P = 0, DSCP = 0, TokenID = 5006 !--- *Entry is built for client and prepared to be forwarded to NPU. !--- Type is 9 (see the table in the [Client Traffic Forwarding](#) section of !--- this document) to allow controller to learn the IP address.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Successfully plumbed mobile rule (ACL ID 255) !--- *A new rule is successfully sent to internal queue to add the client !--- to the NPU.* **Dot1x Process**

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Stopping retransmission timer for mobile 00:1b:77:42:07:69
!--- *Dot1x received message from client.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sending EAPOL-Key Message to mobile 00:1b:77:42:07:69 state PTKINITDONE (message 5 - group), replay counter 00.00.00.00.00.00.00.02 !--- *Group key update prepared for client.* **PEM Process**

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 Added NPU entry of type 9
!--- *NPU reports that entry of type 9 is added (learning address state). !--- See the table in the [Client Traffic Forwarding](#) section of this document.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sent an XID frame !--- *No address known yet, so the controller sends only XID frame !--- (destination broadcast, source client address, control 0xAF).* **Dot1x Process**

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sent EAPOL-Key M5 for mobile 00:1b:77:42:07:69
!--- *Key update sent.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Received EAPOL-Key from mobile 00:1b:77:42:07:69 !--- *Key received.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Received EAPOL-key in REKEYNEGOTIATING state (message 6) from mobile 00:1b:77:42:07:69 !--- *Successfully received group key update.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Stopping retransmission timer for mobile 00:1b:77:42:07:69 !--- *Group key timeout is removed.* **DHCP Process**

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 DHCP received op BOOTREQUEST
(1) (len 308, port 1, encap 0xec03)

!--- First DHCP message received from client. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 DHCP dropping packet due to ongoing mobility handshake exchange, (siaddr 0.0.0.0, mobility state = 'apfMsMmQueryRequested' **PEM Process**

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) mobility role update request from Unassociated to Local

Peer = 0.0.0.0, Old Anchor = 0.0.0.0, New Anchor = 192.168.100.11

!--- NPU is notified that this controller is the local anchor, so to !--- terminate any previous mobility tunnel. As this is a new client, !--- old address is empty. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) State Update from Mobility-Incomplete to Mobility-Complete, mobility role=Local *!--- Role change was successful.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) pemAdvanceState2 3934, Adding TMP rule *!--- Adding temporary rule to NPU for address learning now with new mobility !--- role as local controller.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Replacing Fast Path rule type = Airespace AP - Learn IP address on AP 00:1c:0j:ca:5f:c0, slot 1, interface = 1, QOS = 0 ACL Id = 255, Jumbo Frames = NO, 802.1P = 0, DSCP = 0, TokenID = 5006 *!--- Entry is built.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Successfully plumbed mobile rule (ACL ID 255) *!--- A new rule is successfully sent to internal queue to add the !--- client to the NPU.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 Added NPU entry of type 9 *!--- Client is on address learning state; see the table in the !--- Client Traffic Forwarding section of this document. Now mobility !--- has finished.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sent an XID frame *!--- No address known yet, so controller sends only XID frame (destination !--- broadcast, source client address, control 0xAF).* **DHCP Process**

Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP received op BOOTREQUEST
(1) (len 308, port 1, encap 0xec03)

!--- DHCP request from client. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selecting relay 1 - control block settings: dhcpServer: 0.0.0.0, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay: 0.0.0.0 VLAN: 0 *!--- Based on the WLAN configuration, the controller selects the identity to !--- use to relay the DHCP messages.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selected relay 1 - 192.168.100.254 (local address 192.168.100.11, gateway 192.168.100.254, VLAN 100, port 1) *!--- Interface selected.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP DISCOVER (1) Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP op: BOOTREQUEST, htype: Ethernet, hlen: 6, hops: 1 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP xid: 0xd3d3b6e9 (3553867497), secs: 1024, flags: 0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP chaddr: 00:1b:77:42:07:69 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP ciaddr: 0.0.0.0, yiaddr: 0.0.0.0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP siaddr: 0.0.0.0, giaddr: 192.168.100.11 *!--- Debug parsing of the frame sent. The most important fields are included.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP sending REQUEST to 192.168.100.254 (len 350, port 1, vlan 100) *!--- DHCP request forwarded.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selecting relay 2 - control block settings: dhcpServer: 0.0.0.0, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay: 192.168.100.11 VLAN: 100 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selected relay 2 ? NONE *!--- No secondary server configured, so no additional DHCP request are !--- prepared (configuration dependant).* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP received op BOOTREPLY (2) (len 308, port 1, encap 0xec00) Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP setting server from OFFER (server 192.168.100.254, yiaddr 192.168.100.105) *!--- DHCP received for a known server. Controller discards any offer not on !--- the DHCP server list for the WLAN/Interface.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP sending REPLY to STA (len 416, port 1, vlan 100) *!--- After building the DHCP reply for client, it is sent to AP for forwarding.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP OFFER (2) Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP op: BOOTREPLY, htype: Ethernet, hlen: 6, hops: 0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP xid: 0xd3d3b6e9 (3553867497), secs: 0, flags: 0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP chaddr: 00:1b:77:42:07:69 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP ciaddr: 0.0.0.0, yiaddr: 192.168.100.105 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP siaddr: 0.0.0.0, giaddr: 0.0.0.0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP server id: 1.1.1.1 rcvd server id: 192.168.100.254 *!--- Debug parsing of the frame sent. The most important fields are included.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP received op BOOTREQUEST (1) (len 316, port 1, encap 0xec03) *!--- Client answers* Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selecting relay 1 - control block

settings: dhcpServer: 192.168.100.254, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay: 192.168.100.11 VLAN: 100 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selected relay 1 - 192.168.100.254 (local address 192.168.100.11, gateway 192.168.100.254, VLAN 100, port 1) *!--- DHCP relay selected per WLAN config* Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP REQUEST (3) Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP op: BOOTREQUEST, htype: Ethernet, hlen: 6, hops: 1 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP xid: 0xd3d3b6e9 (3553867497), secs: 1024, flags: 0 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP chaddr: 00:1b:77:42:07:69 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP ciaddr: 0.0.0.0, yiaddr: 0.0.0.0 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP siaddr: 0.0.0.0, giaddr: 192.168.100.11 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP requested ip: 192.168.100.105 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP server id: 192.168.100.254 rcvd server id: 1.1.1.1 *!--- Debug parsing of the frame sent. The most important fields are included.* Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP sending REQUEST to 192.168.100.254 (len 358, port 1, vlan 100) *!--- Request sent to server.* Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selecting relay 2 - control block settings: dhcpServer: 192.168.100.254, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay: 192.168.100.11 VLAN: 100 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selected relay 2 ? NONE *!--- No other DHCP server configured.* Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP received op BOOTREPLY (2) (len 308, port 1, encap 0xec00) *!--- Server sends a DHCP reply, most probably an ACK (see below).* **PEM Process**

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 DHCP_REQD
(7) Change state to RUN (20) last state RUN (20)

!--- DHCP negotiation successful, address is now known, and client !--- is moved to RUN status.
Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 RUN (20) Reached PLUMBFASTPATH: from line 4699 *!--- No L3 security; client entry is sent to NPU.* Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 RUN (20) Replacing Fast Path rule type = Airespace AP Client on AP 00:1c:0j:ca:5f:c0, slot 1, interface = 1, QOS = 0 ACL Id = 255, Jumbo Frames = NO, 802.1P = 0, DSCP = 0, TokenID = 5006 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 RUN (20) Successfully plumbed mobile rule (ACL ID 255) **DHCP Process**

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 Assigning Address
192.168.100.105 to mobile

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP sending REPLY to STA
(len 416, port 1, vlan 100)

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP ACK (5)

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
op: BOOTREPLY, htype: Ethernet, hlen: 6, hops: 0

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
xid: 0xd3d3b6e9 (3553867497), secs: 0, flags: 0

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
chaddr: 00:1b:77:42:07:69

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
ciaddr: 0.0.0.0, yiaddr: 192.168.100.105

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
siaddr: 0.0.0.0, giaddr: 0.0.0.0

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
server id: 1.1.1.1 rcvd server id: 192.168.100.254

PEM Process

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 Added NPU
entry of type 1

!--- Client is now successfully associated to controller. !--- Type is 1; see the table in the Client Traffic Forwarding !--- section of this document. Wed Oct 31 10:46:25 2007:
00:1b:77:42:07:69 Sending a gratuitous ARP for 192.168.100.105, VLAN Id 100 *!--- As address is known, gratuitous ARP is sent to notify.*

Ejemplos de Troubleshooting

Configuración incorrecta de la cifra del cliente

Este ejemplo muestra a un cliente con diversas capacidades al AP. El cliente está sondando para el SSID, pero como la petición de la sonda muestra algunos parámetros no soportados, el cliente nunca procede a las fases de la autenticación/de la asociación. Particularmente, el problema introducido era una discordancia entre el cliente que usaba el WPA, y el AP que hacía publicidad solamente del soporte WPA2:

APF Process

Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 Adding mobile on LWAPP AP
00:1c:0j:ca:5f:c0(0)
!--- A new station is received. After validating type, it is added to the !--- AP that received it. This can happen both on processing association !--- request or probe requests Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 23) in 5 seconds *!--- Sets an expiration timer for this entry in case it does not progress !--- beyond probe status. 5 Seconds corresponds to Probe Timeout. This message !--- might appear with other time values since, during client processing, !--- other functions might set different timeouts depending on state.* Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 apfProcessProbeReq (apf_80211.c:4057) Changing state for mobile 00:1b:77:42:07:69 on AP 00:1c:0j:ca:5f:c0 from Idle to Probe *!--- APF state machine is updated.* Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds *!--- New Probe request update sent AP about client. IMPORTANT: !--- Access points do not forward all probe requests to the controller; they !--- summarize per time interval (by default 500 msec). This information is !--- used later by location and load balancing processes.* Wed Oct 31 10:46:14 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds *!--- New Probe request update sent AP about client.* Wed Oct 31 10:46:14 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds *!--- New Probe request update sent AP about client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds *!--- New Probe request update sent AP about client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Association received from mobile on AP 00:1c:0j:ca:5f:c0 *!--- Access point reports an association request from the client. !--- When the process reaches this point, the client is not excluded and not !--- in mobility intermediate state* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 STA - rates (8): 140 18 152 36 176 72 96 108 0 0 0 0 0 0 0 0 *!--- Controller saves the client supported rates into its connection table. !--- Units are values of 500 kbps, basic (mandatory) rates have the Most Significant bit (MSb) set. !--- The above would be 6mbps basic, 9, 12 basic, 18, 24 basic, 36, 48, 54* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Processing WPA IE type 221, length 24 for mobile 00:1b:77:42:07:69 *!--- Controller validates the 802.11i security information element.* **PEM Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 START (0) Deleted mobile
LWAPP rule on AP [00:1c:0j:ca:5f:c0]
!--- As the client requests new association, APF requests to PEM to delete the !--- client state and remove any traffic forwarding rules that it could have. **APF Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Updated location for station old
AP 00:00:00:00:00:00-0, new AP 00:1c:0j:ca:5f:c0-1
!--- APF updates where this client is located. For example, this client is !--- a new addition; therefore, no value exists for the old location. Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69

0.0.0.0 START (0) Initializing policy !--- PEM notifies that this is a new user. Security policies are checked !--- for enforcement. **PEM Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 START (0) Change state to AUTHCHECK (2) last state AUTHCHECK (2)

!--- PEM marks as authentication check needed. Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 AUTHCHECK (2) Change state to 8021X_REQD (3) last state 8021X_REQD *!--- After the WLAN configuration is checked, the client will need either !--- 802.1x or PSK authentication* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 8021X_REQD (3) Plumbed mobile LWAPP rule on AP 00:1c:0j:ca:5f:c0 *!--- PEM notifies the LWAPP component to add the new client on the AP with !--- a list of negotiated capabilities, rates, Qos, etc.* **APF Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 apfPemAddUser2 (apf_policy.c:209) Changing state for mobile 00:1b:77:42:07:69 on AP 00:1c:0j:ca:5f:c0 from Probe to Associated

!--- APF notifies that client has been moved successfully into associated !--- state. Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Stopping deletion of Mobile Station: (callerId: 48) *!--- The expiration timer for client is removed, as now the session timeout !--- is taking place. This is also part of the above notification !--- (internal code callerId: 48).* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Sending Assoc Response to station on BSSID 00:1c:0j:ca:5f:c0 (status 0) *!--- APF builds and sends the association response to client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 apfProcessAssocReq (apf_80211.c:3838) Changing state for mobile 00:1b:77:42:07:69 on AP 00:1c:0j:ca:5f:c0 from Associated to Associated *!--- The association response was sent successfully; now APF keeps the !--- client in associated state and sets the association timestamp on this point.* **Dot1x Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Creating a new PMK Cache Entry for station 00:1b:77:42:07:69 (RSN 0)

!--- APF calls Dot1x to allocate a new PMK cached entry for the client. !--- RSN is disabled (zero value). Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Initiating WPA PSK to mobile 00:1b:77:42:07:69 *!--- Dot1x signals a new WPA or WPA2 PSK exchange with mobile.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 dot1x - moving mobile 00:1b:77:42:07:69 into Force Auth state *!--- As no EAPOL authentication takes place, the client port is marked as !--- forced Auth. Dot1x performs key negotiation with PSK clients only.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Skipping EAP-Success to mobile 00:1b:77:42:07:69 *!--- For PSK, CCKM or RSN, the EAP success is not sent to client, as there !--- was no EAPOL authentication taking place.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Sending EAPOL-Key Message to mobile 00:1b:77:42:07:69 state INITPMK (message 1), replay counter 00.00.00.00.00.00.00.00 *!--- Dot1x starts the exchange to arrive into PTK. PMK is known, as this !--- is PSK auth. First message is ANonce.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-Key from mobile 00:1b:77:42:07:69 *!--- Message received from client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-key in PKT_START state (message 2) from mobile 00:1b:77:42:07:69 *!--- This signals the start of the validation of the second message !--- from client (SNonce+MIC). No errors are shown, so process continues. !--- Potential errors at this point could be: deflection attack (ACK bit !--- not set on key), MIC errors, invalid key type, invalid key length, etc.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Stopping retransmission timer for mobile 00:1b:77:42:07:69 *!--- Dot1x got an answer for message 1, so retransmission timeout is stopped.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Sending EAPOL-Key Message to mobile 00:1b:77:42:07:69 state PTKINITNEGOTIATING (message 3), replay counter 00.00.00.00.00.00.00.01 *!--- Derive PTK; send GTK + MIC.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-Key from mobile 00:1b:77:42:07:69 *!--- Message received from client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-key in PTKINITNEGOTIATING state (message 4) from mobile 00:1b:77:42:07:69 *!--- This signals the start of validation of message 4 (MIC), which !--- means client installed the keys. Potential errors after this message !--- are MIC validation errors, invalid key types, etc.* **PEM Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 8021X_REQD (3) Change state to L2AUTHCOMPLETE (4) last state L2AUTHCOMPLETE (4)

!--- PEM receives notification and signals the state machine to change to L2 !--- authentication completed. Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 L2AUTHCOMPLETE (4) Plumbed mobile

LWAPP rule on AP 00:1c:0j:ca:5f:c0 *!--- PEM pushes client status and keys to AP through LWAPP component.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 L2AUTHCOMPLETE (4) Change state to DHCP_REQD (7) last state DHCP_REQD (7) *!--- PEM sets the client on address learning status.*
Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) pemAdvanceState2 4238, Adding TMP rule *!--- PEM signals NPU to allow DHCP/ARP traffic to be inspected by controller !--- for the address learning.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Adding Fast Path rule type = Airespace AP - Learn IP address on AP 00:1c:0j:ca:5f:c0, slot 1, interface = 1, QOS = 0 ACL Id = 255, Jumbo Frames = NO, 802.1P = 0, DSCP = 0, TokenID = 5006 *!--- Entry is built for client and prepared to be forwarded to NPU. !--- Type is 9 (see the table in the Client Traffic Forwarding section of !--- this document) to allow controller to learn the IP address.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Successfully plumbed mobile rule (ACL ID 255) *!--- A new rule is successfully sent to internal queue to add the client !--- to the NPU. Dot1x Process*

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Stopping retransmission timer for mobile 00:1b:77:42:07:69
!--- Dot1x received message from client. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sending EAPOL-Key Message to mobile 00:1b:77:42:07:69 state PTKINITDONE (message 5 - group), replay counter 00.00.00.00.00.00.02 *!--- Group key update prepared for client. PEM Process*

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 Added NPU entry of type 9
!--- NPU reports that entry of type 9 is added (learning address state). !--- See the table in the Client Traffic Forwarding section of this document. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sent an XID frame *!--- No address known yet, so the controller sends only XID frame !--- (destination broadcast, source client address, control 0xAF). Dot1x Process*

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sent EAPOL-Key M5 for mobile 00:1b:77:42:07:69
!--- Key update sent. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Received EAPOL-Key from mobile 00:1b:77:42:07:69 *!--- Key received.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Received EAPOL-key in REKEYNEGOTIATING state (message 6) from mobile 00:1b:77:42:07:69 *!--- Successfully received group key update.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Stopping retransmission timer for mobile 00:1b:77:42:07:69 *!--- Group key timeout is removed. DHCP Process*

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 DHCP received op BOOTREQUEST (1) (len 308, port 1, encap 0xec03)
!--- First DHCP message received from client. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 DHCP dropping packet due to ongoing mobility handshake exchange, (siaddr 0.0.0.0, mobility state = 'apfMsMmQueryRequested' **PEM Process**

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) mobility role update request from Unassociated to Local

Peer = 0.0.0.0, Old Anchor = 0.0.0.0, New Anchor = 192.168.100.11
!--- NPU is notified that this controller is the local anchor, so to !--- terminate any previous mobility tunnel. As this is a new client, !--- old address is empty. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) State Update from Mobility-Incomplete to Mobility-Complete, mobility role=Local *!--- Role change was successful.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) pemAdvanceState2 3934, Adding TMP rule *!--- Adding temporary rule to NPU for address learning now with new mobility !--- role as local controller.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Replacing Fast Path rule type = Airespace AP - Learn IP address on AP 00:1c:0j:ca:5f:c0, slot 1, interface = 1, QOS = 0 ACL Id = 255, Jumbo Frames = NO, 802.1P = 0, DSCP = 0, TokenID = 5006 *!--- Entry is built.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Successfully plumbed mobile rule (ACL ID 255) *!--- A new rule is successfully sent to internal queue to add the !--- client to the NPU.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 Added NPU entry of type 9 *!--- Client is on address learning state; see the table in the !--- Client Traffic Forwarding section of this document. Now mobility !--- has finished.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sent an XID frame *!--- No address known yet, so controller sends only XID frame (destination !---*

broadcast, source client address, control 0xAF). **DHCP Process**

Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP received op BOOTREQUEST

(1) (len 308, port 1, encap 0xec03)

!--- DHCP request from client. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selecting relay 1 - control block settings: dhcpServer: 0.0.0.0, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay: 0.0.0.0 VLAN: 0 *!---* Based on the WLAN configuration, the controller selects the identity to *!---* use to relay the DHCP messages. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selected relay 1 - 192.168.100.254 (local address 192.168.100.11, gateway 192.168.100.254, VLAN 100, port 1) *!---* Interface selected. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP DISCOVER (1) Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP op: BOOTREQUEST, htype: Ethernet, hlen: 6, hops: 1 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP xid: 0xd3d3b6e9 (3553867497), secs: 1024, flags: 0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP chaddr: 00:1b:77:42:07:69 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP ciaddr: 0.0.0.0, yiaddr: 0.0.0.0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP siaddr: 0.0.0.0, giaddr: 192.168.100.11 *!---* Debug parsing of the frame sent. The most important fields are included. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP sending REQUEST to 192.168.100.254 (len 350, port 1, vlan 100) *!---* DHCP request forwarded. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selecting relay 2 - control block settings: dhcpServer: 0.0.0.0, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay: 192.168.100.11 VLAN: 100 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selected relay 2 ? NONE *!---* No secondary server configured, so no additional DHCP request are *!---* prepared (configuration dependant). Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP received op BOOTREPLY (2) (len 308, port 1, encap 0xec00) Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP setting server from OFFER (server 192.168.100.254, yiaddr 192.168.100.105) *!---* DHCP received for a known server. Controller discards any offer not on *!---* the DHCP server list for the WLAN/Interface. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP sending REPLY to STA (len 416, port 1, vlan 100) *!---* After building the DHCP reply for client, it is sent to AP for forwarding. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP OFFER (2) Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP op: BOOTREPLY, htype: Ethernet, hlen: 6, hops: 0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP xid: 0xd3d3b6e9 (3553867497), secs: 0, flags: 0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP chaddr: 00:1b:77:42:07:69 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP ciaddr: 0.0.0.0, yiaddr: 192.168.100.105 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP siaddr: 0.0.0.0, giaddr: 0.0.0.0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP server id: 1.1.1.1 rcvd server id: 192.168.100.254 *!---* Debug parsing of the frame sent. The most important fields are included. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP received op BOOTREQUEST (1) (len 316, port 1, encap 0xec03) *!---* Client answers Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selecting relay 1 - control block settings: dhcpServer: 192.168.100.254, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay: 192.168.100.11 VLAN: 100 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selected relay 1 - 192.168.100.254 (local address 192.168.100.11, gateway 192.168.100.254, VLAN 100, port 1) *!---* DHCP relay selected per WLAN config Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP REQUEST (3) Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP op: BOOTREQUEST, htype: Ethernet, hlen: 6, hops: 1 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP xid: 0xd3d3b6e9 (3553867497), secs: 1024, flags: 0 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP chaddr: 00:1b:77:42:07:69 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP ciaddr: 0.0.0.0, yiaddr: 0.0.0.0 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP siaddr: 0.0.0.0, giaddr: 192.168.100.11 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP requested ip: 192.168.100.105 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP server id: 192.168.100.254 rcvd server id: 1.1.1.1 *!---* Debug parsing of the frame sent. The most important fields are included. Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP sending REQUEST to 192.168.100.254 (len 358, port 1, vlan 100) *!---* Request sent to server. Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selecting relay 2 - control block settings: dhcpServer: 192.168.100.254, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay: 192.168.100.11 VLAN: 100 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selected relay 2 ? NONE *!---* No other DHCP server configured. Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP received op BOOTREPLY (2) (len 308, port 1, encap 0xec00) *!---* Server sends a DHCP reply, most probably an ACK (see below). **PEM Process**

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 DHCP_REQD

(7) Change state to RUN (20) last state RUN (20)

!--- DHCP negotiation successful, address is now known, and client *!---* is moved to RUN status. Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 RUN (20) Reached PLUMBFASTPATH: from line 4699 *!---* No L3 security; client entry is sent to NPU. Wed Oct 31 10:46:25 2007:

00:1b:77:42:07:69 192.168.100.105 RUN (20) Replacing Fast Path rule type = Airespace AP Client on AP 00:1c:0j:ca:5f:c0, slot 1, interface = 1, QOS = 0 ACL Id = 255, Jumbo Frames = NO, 802.1P = 0, DSCP = 0, TokenID = 5006 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 RUN (20) Successfully plumbed mobile rule (ACL ID 255) **DHCP Process**

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 Assigning Address 192.168.100.105 to mobile

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP sending REPLY to STA (len 416, port 1, vlan 100)

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP ACK (5)

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP op: BOOTREPLY, htype: Ethernet, hlen: 6, hops: 0

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP xid: 0xd3d3b6e9 (3553867497), secs: 0, flags: 0

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP chaddr: 00:1b:77:42:07:69

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP ciaddr: 0.0.0.0, yiaddr: 192.168.100.105

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP siaddr: 0.0.0.0, giaddr: 0.0.0.0

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP server id: 1.1.1.1 rcvd server id: 192.168.100.254

PEM Process

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 Added NPU entry of type 1

!--- Client is now successfully associated to controller. !--- Type is 1; see the table in the [Client Traffic Forwarding](#) !--- section of this document. Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 Sending a gratuitous ARP for 192.168.100.105, VLAN Id 100 *!--- As address is known, gratuitous ARP is sent to notify.*

APF Process

Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 Adding mobile on LWAPP AP 00:1c:0j:ca:5f:c0(0)

!--- A new station is received. After validating type, it is added to the !--- AP that received it. This can happen both on processing association !--- request or probe requests Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 23) in 5 seconds *!--- Sets an expiration timer for this entry in case it does not progress !--- beyond probe status. 5 Seconds corresponds to Probe Timeout. This message !--- might appear with other time values since, during client processing, !--- other functions might set different timeouts depending on state.* Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 apfProcessProbeReq (apf_80211.c:4057) Changing state for mobile 00:1b:77:42:07:69 on AP 00:1c:0j:ca:5f:c0 from Idle to Probe *!--- APF state machine is updated.* Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds *!--- New Probe request update sent AP about client. IMPORTANT: !--- Access points do not forward all probe requests to the controller; they !--- summarize per time interval (by default 500 msec). This information is !--- used later by location and load balancing processes.* Wed Oct 31 10:46:14 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds *!--- New*

Probe request update sent AP about client. Wed Oct 31 10:46:14 2007: 00:1b:77:42:07:69
Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds !--- New Probe request update
sent AP about client. Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile
Station: (callerId: 24) in 5 seconds !--- New Probe request update sent AP about client. Wed Oct
31 10:46:15 2007: 00:1b:77:42:07:69 Association received from mobile on AP 00:1c:0j:ca:5f:c0 !---
- Access point reports an association request from the client. !--- When the process reaches
this point, the client is not excluded and not !--- in mobility intermediate state Wed Oct 31
10:46:15 2007: 00:1b:77:42:07:69 STA - rates (8): 140 18 152 36 176 72 96 108 0 0 0 0 0 0 0 0 !---
-- Controller saves the client supported rates into its connection table. !--- Units are values
of 500 kbps, basic (mandatory) rates have the Most Significant bit (MSb) set. !--- The above
would be 6mbps basic, 9, 12 basic, 18, 24 basic, 36, 48, 54 Wed Oct 31 10:46:15 2007:
00:1b:77:42:07:69 Processing WPA IE type 221, length 24 for mobile 00:1b:77:42:07:69 !---
Controller validates the 802.11i security information element. **PEM Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 START (0) Deleted mobile
LWAPP rule on AP [00:1c:0j:ca:5f:c0]
!--- As the client requests new association, APF requests to PEM to delete the !--- client state
and remove any traffic forwarding rules that it could have. **APF Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Updated location for station old
AP 00:00:00:00:00:00-0, new AP 00:1c:0j:ca:5f:c0-1
!--- APF updates where this client is located. For example, this client is !--- a new addition;
therefore, no value exists for the old location. Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69
0.0.0.0 START (0) Initializing policy !--- PEM notifies that this is a new user. Security
policies are checked !--- for enforcement. **PEM Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 START (0) Change state
to AUTHCHECK (2) last state AUTHCHECK (2)
!--- PEM marks as authentication check needed. Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69
0.0.0.0 AUTHCHECK (2) Change state to 8021X_REQD (3) last state 8021X_REQD !--- After the WLAN
configuration is checked, the client will need either !--- 802.1x or PSK authentication Wed Oct
31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 8021X_REQD (3) Plumbed mobile LWAPP rule on AP
00:1c:0j:ca:5f:c0 !--- PEM notifies the LWAPP component to add the new client on the AP with !---
- a list of negotiated capabilities, rates, Qos, etc. **APF Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 apfPemAddUser2 (apf_policy.c:209)
Changing state for mobile 00:1b:77:42:07:69 on AP 00:1c:0j:ca:5f:c0 from
Probe to Associated
!--- APF notifies that client has been moved successfully into associated !--- state. Wed Oct 31
10:46:15 2007: 00:1b:77:42:07:69 Stopping deletion of Mobile Station: (callerId: 48) !--- The
expiration timer for client is removed, as now the session timeout !--- is taking place. This is
also part of the above notification !--- (internal code callerId: 48). Wed Oct 31 10:46:15 2007:
00:1b:77:42:07:69 Sending Assoc Response to station on BSSID 00:1c:0j:ca:5f:c0 (status 0) !---
APF builds and sends the association response to client. Wed Oct 31 10:46:15 2007:
00:1b:77:42:07:69 apfProcessAssocReq (apf_80211.c:3838) Changing state for mobile
00:1b:77:42:07:69 on AP 00:1c:0j:ca:5f:c0 from Associated to Associated !--- The association
response was sent successfully; now APF keeps the !--- client in associated state and sets the
association timestamp on this point. **Dot1x Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Creating a new PMK Cache Entry
for station 00:1b:77:42:07:69 (RSN 0)
!--- APF calls Dot1x to allocate a new PMK cached entry for the client. !--- RSN is disabled
(zero value). Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Initiating WPA PSK to mobile
00:1b:77:42:07:69 !--- Dot1x signals a new WPA or WPA2 PSK exchange with mobile. Wed Oct 31
10:46:15 2007: 00:1b:77:42:07:69 dot1x - moving mobile 00:1b:77:42:07:69 into Force Auth state
!--- As no EAPOL authentication takes place, the client port is marked as !--- forced Auth.
Dot1x performs key negotiation with PSK clients only. Wed Oct 31 10:46:15 2007:
00:1b:77:42:07:69 Skipping EAP-Success to mobile 00:1b:77:42:07:69 !--- For PSK, CCKM or RSN,
the EAP success is not sent to client, as there !--- was no EAPOL authentication taking place.

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Sending EAPOL-Key Message to mobile
00:1b:77:42:07:69 state INITPMK (message 1), replay counter 00.00.00.00.00.00.00.00 *!--- Dot1x starts the exchange to arrive into PTK. PMK is known, as this !--- is PSK auth. First message is ANonce.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-Key from mobile
00:1b:77:42:07:69 *!--- Message received from client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-key in PKT_START state (message 2) from mobile 00:1b:77:42:07:69 *!--- This signals the start of the validation of the second message !--- from client (SNonce+MIC). No errors are shown, so process continues. !--- Potential errors at this point could be: deflection attack (ACK bit !--- not set on key), MIC errors, invalid key type, invalid key length, etc.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Stopping retransmission timer for mobile
00:1b:77:42:07:69 *!--- Dot1x got an answer for message 1, so retransmission timeout is stopped.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Sending EAPOL-Key Message to mobile
00:1b:77:42:07:69 state PTKINITNEGOTIATING (message 3), replay counter 00.00.00.00.00.00.00.01 *!--- Derive PTK; send GTK + MIC.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-Key from mobile 00:1b:77:42:07:69 *!--- Message received from client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-key in PTKINITNEGOTIATING state (message 4) from mobile
00:1b:77:42:07:69 *!--- This signals the start of validation of message 4 (MIC), which !--- means client installed the keys. Potential errors after this message !--- are MIC validation errors, invalid key types, etc. PEM Process*

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 8021X_REQD (3) Change state to L2AUTHCOMPLETE (4) last state L2AUTHCOMPLETE (4)
!--- PEM receives notification and signals the state machine to change to L2 !--- authentication completed. Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 L2AUTHCOMPLETE (4) Plumbed mobile LWAPP rule on AP 00:1c:0j:ca:5f:c0 *!--- PEM pushes client status and keys to AP through LWAPP component.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 L2AUTHCOMPLETE (4) Change state to DHCP_REQD (7) last state DHCP_REQD (7) *!--- PEM sets the client on address learning status.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) pemAdvanceState2 4238, Adding TMP rule *!--- PEM signals NPU to allow DHCP/ARP traffic to be inspected by controller !--- for the address learning.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Adding Fast Path rule type = Airespace AP - Learn IP address on AP 00:1c:0j:ca:5f:c0, slot 1, interface = 1, QOS = 0 ACL Id = 255, Jumbo Frames = NO, 802.1P = 0, DSCP = 0, TokenID = 5006 *!--- Entry is built for client and prepared to be forwarded to NPU. !--- Type is 9 (see the table in the [Client Traffic Forwarding](#) section of !--- this document) to allow controller to learn the IP address.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Successfully plumbed mobile rule (ACL ID 255) *!--- A new rule is successfully sent to internal queue to add the client !--- to the NPU. Dot1x Process*

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Stopping retransmission timer for mobile 00:1b:77:42:07:69
!--- Dot1x received message from client. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sending EAPOL-Key Message to mobile 00:1b:77:42:07:69 state PTKINITDONE (message 5 - group), replay counter 00.00.00.00.00.00.00.02 *!--- Group key update prepared for client. PEM Process*

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 Added NPU entry of type 9
!--- NPU reports that entry of type 9 is added (learning address state). !--- See the table in the [Client Traffic Forwarding](#) section of this document. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sent an XID frame *!--- No address known yet, so the controller sends only XID frame !--- (destination broadcast, source client address, control 0xAF). Dot1x Process*

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sent EAPOL-Key M5 for mobile 00:1b:77:42:07:69
!--- Key update sent. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Received EAPOL-Key from mobile 00:1b:77:42:07:69 *!--- Key received.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Received EAPOL-key in REKEYNEGOTIATING state (message 6) from mobile 00:1b:77:42:07:69 *!--- Successfully received group key update.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Stopping retransmission timer for mobile 00:1b:77:42:07:69 *!--- Group key timeout is removed. DHCP Process*

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 DHCP received op BOOTREQUEST

(1) (len 308, port 1, encap 0xec03)
!--- First DHCP message received from client. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 DHCP dropping packet due to ongoing mobility handshake exchange, (siaddr 0.0.0.0, mobility state = 'apfMsMmQueryRequested' **PEM Process**

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) mobility role update request from Unassociated to Local

Peer = 0.0.0.0, Old Anchor = 0.0.0.0, New Anchor = 192.168.100.11
!--- NPU is notified that this controller is the local anchor, so to *!---* terminate any previous mobility tunnel. As this is a new client, *!---* old address is empty. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) State Update from Mobility-Incomplete to Mobility-Complete, mobility role=Local *!---* Role change was successful. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) pemAdvanceState2 3934, Adding TMP rule *!---* Adding temporary rule to NPU for address learning now with new mobility *!---* role as local controller. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Replacing Fast Path rule type = Airespace AP - Learn IP address on AP 00:1c:0j:ca:5f:c0, slot 1, interface = 1, QOS = 0 ACL Id = 255, Jumbo Frames = NO, 802.1P = 0, DSCP = 0, TokenID = 5006 *!---* Entry is built. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Successfully plumbed mobile rule (ACL ID 255) *!---* A new rule is successfully sent to internal queue to add the *!---* client to the NPU. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 Added NPU entry of type 9 *!---* Client is on address learning state; see the table in the *!---* Client Traffic Forwarding section of this document. Now mobility *!---* has finished. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sent an XID frame *!---* No address known yet, so controller sends only XID frame (destination *!---* broadcast, source client address, control 0xAF). **DHCP Process**

Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP received op BOOTREQUEST
(1) (len 308, port 1, encap 0xec03)
!--- DHCP request from client. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selecting relay 1 - control block settings: dhcpServer: 0.0.0.0, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay: 0.0.0.0 VLAN: 0 *!---* Based on the WLAN configuration, the controller selects the identity to *!---* use to relay the DHCP messages. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selected relay 1 - 192.168.100.254 (local address 192.168.100.11, gateway 192.168.100.254, VLAN 100, port 1) *!---* Interface selected. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP DISCOVER (1) Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP op: BOOTREQUEST, htype: Ethernet, hlen: 6, hops: 1 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP xid: 0xd3d3b6e9 (3553867497), secs: 1024, flags: 0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP chaddr: 00:1b:77:42:07:69 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP ciaddr: 0.0.0.0, yiaddr: 0.0.0.0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP siaddr: 0.0.0.0, giaddr: 192.168.100.11 *!---* Debug parsing of the frame sent. The most important fields are included. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP sending REQUEST to 192.168.100.254 (len 350, port 1, vlan 100) *!---* DHCP request forwarded. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selecting relay 2 - control block settings: dhcpServer: 0.0.0.0, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay: 192.168.100.11 VLAN: 100 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selected relay 2 ? NONE *!---* No secondary server configured, so no additional DHCP request are *!---* prepared (configuration dependant). Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP received op BOOTREPLY (2) (len 308, port 1, encap 0xec00) Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP setting server from OFFER (server 192.168.100.254, yiaddr 192.168.100.105) *!---* DHCP received for a known server. Controller discards any offer not on *!---* the DHCP server list for the WLAN/Interface. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP sending REPLY to STA (len 416, port 1, vlan 100) *!---* After building the DHCP reply for client, it is sent to AP for forwarding. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP OFFER (2) Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP op: BOOTREPLY, htype: Ethernet, hlen: 6, hops: 0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP xid: 0xd3d3b6e9 (3553867497), secs: 0, flags: 0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP chaddr: 00:1b:77:42:07:69 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP ciaddr: 0.0.0.0, yiaddr: 192.168.100.105 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP siaddr: 0.0.0.0, giaddr: 0.0.0.0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP server id: 1.1.1.1 rcvd server id: 192.168.100.254 *!---* Debug parsing of the frame sent. The most important fields are included. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP received op BOOTREQUEST (1) (len 316, port 1, encap 0xec03) *!---* Client answers Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selecting relay 1 - control block settings: dhcpServer: 192.168.100.254, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay:

192.168.100.11 VLAN: 100 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selected relay 1 -
192.168.100.254 (local address 192.168.100.11, gateway 192.168.100.254, VLAN 100, port 1) !---
DHCP relay selected per WLAN config Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
transmitting DHCP REQUEST (3) Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP op: BOOTREQUEST,
htype: Ethernet, hlen: 6, hops: 1 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP xid:
0xd3d3b6e9 (3553867497), secs: 1024, flags: 0 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
chaddr: 00:1b:77:42:07:69 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP ciaddr: 0.0.0.0,
yiaddr: 0.0.0.0 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP siaddr: 0.0.0.0, giaddr:
192.168.100.11 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP requested ip: 192.168.100.105
Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP server id: 192.168.100.254 rcvd server id:
1.1.1.1 !--- *Debug parsing of the frame sent. The most important fields are included.* Wed Oct 31
10:46:25 2007: 00:1b:77:42:07:69 DHCP sending REQUEST to 192.168.100.254 (len 358, port 1, vlan
100) !--- *Request sent to server.* Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selecting
relay 2 - control block settings: dhcpServer: 192.168.100.254, dhcpNetmask: 0.0.0.0,
dhcpGateway: 0.0.0.0, dhcpRelay: 192.168.100.11 VLAN: 100 Wed Oct 31 10:46:25 2007:
00:1b:77:42:07:69 DHCP selected relay 2 ? NONE !--- *No other DHCP server configured.* Wed Oct 31
10:46:25 2007: 00:1b:77:42:07:69 DHCP received op BOOTREPLY (2) (len 308, port 1, encap 0xec00)
!--- *Server sends a DHCP reply, most probably an ACK (see below).* **PEM Process**

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 DHCP_REQD
(7) Change state to RUN (20) last state RUN (20)

!--- *DHCP negotiation successful, address is now known, and client !--- is moved to RUN status.*
Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 RUN (20) Reached PLUMBFASTPATH: from
line 4699 !--- *No L3 security; client entry is sent to NPU.* Wed Oct 31 10:46:25 2007:
00:1b:77:42:07:69 192.168.100.105 RUN (20) Replacing Fast Path rule type = Airespace AP Client
on AP 00:1c:0j:ca:5f:c0, slot 1, interface = 1, QOS = 0 ACL Id = 255, Jumbo Frames = NO, 802.1P
= 0, DSCP = 0, TokenID = 5006 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 RUN
(20) Successfully plumbed mobile rule (ACL ID 255) **DHCP Process**

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 Assigning Address
192.168.100.105 to mobile

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP sending REPLY to STA
(len 416, port 1, vlan 100)

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP ACK (5)

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
op: BOOTREPLY, htype: Ethernet, hlen: 6, hops: 0

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
xid: 0xd3d3b6e9 (3553867497), secs: 0, flags: 0

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
chaddr: 00:1b:77:42:07:69

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
ciaddr: 0.0.0.0, yiaddr: 192.168.100.105

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
siaddr: 0.0.0.0, giaddr: 0.0.0.0

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
server id: 1.1.1.1 rcvd server id: 192.168.100.254

PEM Process

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 Added NPU
entry of type 1

!--- *Client is now successfully associated to controller. !--- Type is 1; see the table in the*

[Client Traffic Forwarding](#) !--- section of this document. Wed Oct 31 10:46:25 2007:
00:1b:77:42:07:69 Sending a gratuitous ARP for 192.168.100.105, VLAN Id 100 !--- As address is
known, gratuitous ARP is sent to notify.

Clave incorrecta del preshared

Esto muestra el cliente que intenta autentificar por el WPA-PSK a la infraestructura, pero fallar debido unir mal de la clave del preshared entre el cliente y el regulador, resultando en poner eventual del cliente:

APF Process

Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 Adding mobile on LWAPP AP
00:1c:0j:ca:5f:c0(0)
!--- A new station is received. After validating type, it is added to the !--- AP that received it. This can happen both on processing association !--- request or probe requests Wed Oct 31
10:46:13 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 23) in 5
seconds *!--- Sets an expiration timer for this entry in case it does not progress !--- beyond
probe status. 5 Seconds corresponds to Probe Timeout. This message !--- might appear with other
time values since, during client processing, !--- other functions might set different timeouts
depending on state.* Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69 apfProcessProbeReq
(apf_80211.c:4057) Changing state for mobile 00:1b:77:42:07:69 on AP 00:1c:0j:ca:5f:c0 from Idle
to Probe *!--- APF state machine is updated.* Wed Oct 31 10:46:13 2007: 00:1b:77:42:07:69
Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds *!--- New Probe request update
sent AP about client. IMPORTANT: !--- Access points do not forward all probe requests to the
controller; they !--- summarize per time interval (by default 500 msec). This information is !--
- used later by location and load balancing processes.* Wed Oct 31 10:46:14 2007:
00:1b:77:42:07:69 Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds *!--- New
Probe request update sent AP about client.* Wed Oct 31 10:46:14 2007: 00:1b:77:42:07:69
Scheduling deletion of Mobile Station: (callerId: 24) in 5 seconds *!--- New Probe request update
sent AP about client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Scheduling deletion of Mobile
Station: (callerId: 24) in 5 seconds *!--- New Probe request update sent AP about client.* Wed Oct
31 10:46:15 2007: 00:1b:77:42:07:69 Association received from mobile on AP 00:1c:0j:ca:5f:c0 *!--
- Access point reports an association request from the client. !--- When the process reaches
this point, the client is not excluded and not !--- in mobility intermediate state* Wed Oct 31
10:46:15 2007: 00:1b:77:42:07:69 STA - rates (8): 140 18 152 36 176 72 96 108 0 0 0 0 0 0 0 0 *!--
- Controller saves the client supported rates into its connection table. !--- Units are values
of 500 kbps, basic (mandatory) rates have the Most Significant bit (MSb) set. !--- The above
would be 6mbps basic, 9, 12 basic, 18, 24 basic, 36, 48, 54* Wed Oct 31 10:46:15 2007:
00:1b:77:42:07:69 Processing WPA IE type 221, length 24 for mobile 00:1b:77:42:07:69 *!---
Controller validates the 802.11i security information element.* **PEM Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 START (0) Deleted mobile
LWAPP rule on AP [00:1c:0j:ca:5f:c0]
*!--- As the client requests new association, APF requests to PEM to delete the !--- client state
and remove any traffic forwarding rules that it could have.* **APF Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Updated location for station old
AP 00:00:00:00:00:00-0, new AP 00:1c:0j:ca:5f:c0-1
*!--- APF updates where this client is located. For example, this client is !--- a new addition;
therefore, no value exists for the old location.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69
0.0.0.0 START (0) Initializing policy *!--- PEM notifies that this is a new user. Security
policies are checked !--- for enforcement.* **PEM Process**

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 START (0) Change state
to AUTHCHECK (2) last state AUTHCHECK (2)
!--- PEM marks as authentication check needed. Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69

0.0.0.0 AUTHCHECK (2) Change state to 8021X_REQD (3) last state 8021X_REQD *!--- After the WLAN configuration is checked, the client will need either !--- 802.1x or PSK authentication* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 8021X_REQD (3) Plumbed mobile LWAPP rule on AP 00:1c:0j:ca:5f:c0 *!--- PEM notifies the LWAPP component to add the new client on the AP with !--- a list of negotiated capabilities, rates, Qos, etc. APF Process*

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 apfPemAddUser2 (apf_policy.c:209)
Changing state for mobile 00:1b:77:42:07:69 on AP 00:1c:0j:ca:5f:c0 from
Probe to Associated

!--- APF notifies that client has been moved successfully into associated !--- state. Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Stopping deletion of Mobile Station: (callerId: 48) *!--- The expiration timer for client is removed, as now the session timeout !--- is taking place. This is also part of the above notification !--- (internal code callerId: 48).* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Sending Assoc Response to station on BSSID 00:1c:0j:ca:5f:c0 (status 0) *!--- APF builds and sends the association response to client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 apfProcessAssocReq (apf_80211.c:3838) Changing state for mobile 00:1b:77:42:07:69 on AP 00:1c:0j:ca:5f:c0 from Associated to Associated *!--- The association response was sent successfully; now APF keeps the !--- client in associated state and sets the association timestamp on this point. Dot1x Process*

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Creating a new PMK Cache Entry
for station 00:1b:77:42:07:69 (RSN 0)

!--- APF calls Dot1x to allocate a new PMK cached entry for the client. !--- RSN is disabled (zero value). Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Initiating WPA PSK to mobile 00:1b:77:42:07:69 *!--- Dot1x signals a new WPA or WPA2 PSK exchange with mobile.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 dot1x - moving mobile 00:1b:77:42:07:69 into Force Auth state *!--- As no EAPOL authentication takes place, the client port is marked as !--- forced Auth. Dot1x performs key negotiation with PSK clients only.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Skipping EAP-Success to mobile 00:1b:77:42:07:69 *!--- For PSK, CCKM or RSN, the EAP success is not sent to client, as there !--- was no EAPOL authentication taking place.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Sending EAPOL-Key Message to mobile 00:1b:77:42:07:69 state INITPMK (message 1), replay counter 00.00.00.00.00.00.00.00 *!--- Dot1x starts the exchange to arrive into PTK. PMK is known, as this !--- is PSK auth. First message is ANonce.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-Key from mobile 00:1b:77:42:07:69 *!--- Message received from client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-key in PKT_START state (message 2) from mobile 00:1b:77:42:07:69 *!--- This signals the start of the validation of the second message !--- from client (SNonce+MIC). No errors are shown, so process continues. !--- Potential errors at this point could be: deflection attack (ACK bit !--- not set on key), MIC errors, invalid key type, invalid key length, etc.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Stopping retransmission timer for mobile 00:1b:77:42:07:69 *!--- Dot1x got an answer for message 1, so retransmission timeout is stopped.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Sending EAPOL-Key Message to mobile 00:1b:77:42:07:69 state PTKINITNEGOTIATING (message 3), replay counter 00.00.00.00.00.00.00.01 *!--- Derive PTK; send GTK + MIC.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-Key from mobile 00:1b:77:42:07:69 *!--- Message received from client.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 Received EAPOL-key in PTKINITNEGOTIATING state (message 4) from mobile 00:1b:77:42:07:69 *!--- This signals the start of validation of message 4 (MIC), which !--- means client installed the keys. Potential errors after this message !--- are MIC validation errors, invalid key types, etc. PEM Process*

Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 8021X_REQD (3) Change
state to L2AUTHCOMPLETE (4) last state L2AUTHCOMPLETE (4)

!--- PEM receives notification and signals the state machine to change to L2 !--- authentication completed. Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 L2AUTHCOMPLETE (4) Plumbed mobile LWAPP rule on AP 00:1c:0j:ca:5f:c0 *!--- PEM pushes client status and keys to AP through LWAPP component.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 L2AUTHCOMPLETE (4) Change state to DHCP_REQD (7) last state DHCP_REQD (7) *!--- PEM sets the client on address learning status.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) pemAdvanceState2 4238, Adding TMP rule *!--- PEM signals NPU to allow DHCP/ARP traffic to be inspected by controller !--- for the address learning.* Wed Oct 31 10:46:15 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Adding Fast Path rule type = Airespace AP - Learn IP address on AP 00:1c:0j:ca:5f:c0, slot 1, interface

= 1, QOS = 0 ACL Id = 255, Jumbo Frames = NO, 802.1P = 0, DSCP = 0, TokenID = 5006 *!--- Entry is built for client and prepared to be forwarded to NPU. !--- Type is 9 (see the table in the [Client Traffic Forwarding](#) section of *!--- this document*) to allow controller to learn the IP address.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Successfully plumbed mobile rule (ACL ID 255) *!--- A new rule is successfully sent to internal queue to add the client !--- to the NPU. Dot1x Process*

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Stopping retransmission timer for mobile 00:1b:77:42:07:69

!--- Dot1x received message from client. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sending EAPOL-Key Message to mobile 00:1b:77:42:07:69 state PTKINITDONE (message 5 - group), replay counter 00.00.00.00.00.00.02 *!--- Group key update prepared for client. PEM Process*

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 Added NPU entry of type 9

!--- NPU reports that entry of type 9 is added (learning address state). !--- See the table in the [Client Traffic Forwarding](#) section of this document. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sent an XID frame *!--- No address known yet, so the controller sends only XID frame !--- (destination broadcast, source client address, control 0xAF). Dot1x Process*

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sent EAPOL-Key M5 for mobile 00:1b:77:42:07:69

!--- Key update sent. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Received EAPOL-Key from mobile 00:1b:77:42:07:69 *!--- Key received.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Received EAPOL-key in REKEYNEGOTIATING state (message 6) from mobile 00:1b:77:42:07:69 *!--- Successfully received group key update.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Stopping retransmission timer for mobile 00:1b:77:42:07:69 *!--- Group key timeout is removed. DHCP Process*

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 DHCP received op BOOTREQUEST (1) (len 308, port 1, encap 0xec03)

!--- First DHCP message received from client. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 DHCP dropping packet due to ongoing mobility handshake exchange, (siaddr 0.0.0.0, mobility state = 'apfMsMmQueryRequested' **PEM Process**

Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) mobility role update request from Unassociated to Local

Peer = 0.0.0.0, Old Anchor = 0.0.0.0, New Anchor = 192.168.100.11

!--- NPU is notified that this controller is the local anchor, so to !--- terminate any previous mobility tunnel. As this is a new client, !--- old address is empty. Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) State Update from Mobility-Incomplete to Mobility-Complete, mobility role=Local *!--- Role change was successful.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) pemAdvanceState2 3934, Adding TMP rule *!--- Adding temporary rule to NPU for address learning now with new mobility !--- role as local controller.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Replacing Fast Path rule type = Airespace AP - Learn IP address on AP 00:1c:0j:ca:5f:c0, slot 1, interface = 1, QOS = 0 ACL Id = 255, Jumbo Frames = NO, 802.1P = 0, DSCP = 0, TokenID = 5006 *!--- Entry is built.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 DHCP_REQD (7) Successfully plumbed mobile rule (ACL ID 255) *!--- A new rule is successfully sent to internal queue to add the !--- client to the NPU.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 0.0.0.0 Added NPU entry of type 9 *!--- Client is on address learning state; see the table in the !--- [Client Traffic Forwarding](#) section of this document. Now mobility !--- has finished.* Wed Oct 31 10:46:19 2007: 00:1b:77:42:07:69 Sent an XID frame *!--- No address known yet, so controller sends only XID frame (destination !--- broadcast, source client address, control 0xAF). DHCP Process*

Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP received op BOOTREQUEST (1) (len 308, port 1, encap 0xec03)

!--- DHCP request from client. Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selecting relay 1 - control block settings: dhcpServer: 0.0.0.0, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0,

dhcpRelay: 0.0.0.0 VLAN: 0 *!--- Based on the WLAN configuration, the controller selects the identity to !--- use to relay the DHCP messages.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selected relay 1 - 192.168.100.254 (local address 192.168.100.11, gateway 192.168.100.254, VLAN 100, port 1) *!--- Interface selected.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP DISCOVER (1) Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP op: BOOTREQUEST, htype: Ethernet, hlen: 6, hops: 1 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP xid: 0xd3d3b6e9 (3553867497), secs: 1024, flags: 0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP chaddr: 00:1b:77:42:07:69 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP ciaddr: 0.0.0.0, yiaddr: 0.0.0.0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP siaddr: 0.0.0.0, giaddr: 192.168.100.11 *!--- Debug parsing of the frame sent. The most important fields are included.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP sending REQUEST to 192.168.100.254 (len 350, port 1, vlan 100) *!--- DHCP request forwarded.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selecting relay 2 - control block settings: dhcpServer: 0.0.0.0, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay: 192.168.100.11 VLAN: 100 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP selected relay 2 ? NONE *!--- No secondary server configured, so no additional DHCP request are !--- prepared (configuration dependant).* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP received op BOOTREPLY (2) (len 308, port 1, encap 0xec00) Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP setting server from OFFER (server 192.168.100.254, yiaddr 192.168.100.105) *!--- DHCP received for a known server. Controller discards any offer not on !--- the DHCP server list for the WLAN/Interface.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP sending REPLY to STA (len 416, port 1, vlan 100) *!--- After building the DHCP reply for client, it is sent to AP for forwarding.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP OFFER (2) Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP op: BOOTREPLY, htype: Ethernet, hlen: 6, hops: 0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP xid: 0xd3d3b6e9 (3553867497), secs: 0, flags: 0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP chaddr: 00:1b:77:42:07:69 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP ciaddr: 0.0.0.0, yiaddr: 192.168.100.105 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP siaddr: 0.0.0.0, giaddr: 0.0.0.0 Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP server id: 1.1.1.1 rcvd server id: 192.168.100.254 *!--- Debug parsing of the frame sent. The most important fields are included.* Wed Oct 31 10:46:21 2007: 00:1b:77:42:07:69 DHCP received op BOOTREQUEST (1) (len 316, port 1, encap 0xec03) *!--- Client answers* Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selecting relay 1 - control block settings: dhcpServer: 192.168.100.254, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay: 192.168.100.11 VLAN: 100 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selected relay 1 - 192.168.100.254 (local address 192.168.100.11, gateway 192.168.100.254, VLAN 100, port 1) *!--- DHCP relay selected per WLAN config* Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP REQUEST (3) Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP op: BOOTREQUEST, htype: Ethernet, hlen: 6, hops: 1 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP xid: 0xd3d3b6e9 (3553867497), secs: 1024, flags: 0 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP chaddr: 00:1b:77:42:07:69 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP ciaddr: 0.0.0.0, yiaddr: 0.0.0.0 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP siaddr: 0.0.0.0, giaddr: 192.168.100.11 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP requested ip: 192.168.100.105 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP server id: 192.168.100.254 rcvd server id: 1.1.1.1 *!--- Debug parsing of the frame sent. The most important fields are included.* Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP sending REQUEST to 192.168.100.254 (len 358, port 1, vlan 100) *!--- Request sent to server.* Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selecting relay 2 - control block settings: dhcpServer: 192.168.100.254, dhcpNetmask: 0.0.0.0, dhcpGateway: 0.0.0.0, dhcpRelay: 192.168.100.11 VLAN: 100 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP selected relay 2 ? NONE *!--- No other DHCP server configured.* Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP received op BOOTREPLY (2) (len 308, port 1, encap 0xec00) *!--- Server sends a DHCP reply, most probably an ACK (see below).* **PEM Process**

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 DHCP_REQD
(7) Change state to RUN (20) last state RUN (20)

!--- DHCP negotiation successful, address is now known, and client !--- is moved to RUN status.
Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 RUN (20) Reached PLUMBFASTPATH: from line 4699 *!--- No L3 security; client entry is sent to NPU.* Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 RUN (20) Replacing Fast Path rule type = Airespace AP Client on AP 00:1c:0j:ca:5f:c0, slot 1, interface = 1, QOS = 0 ACL Id = 255, Jumbo Frames = NO, 802.1P = 0, DSCP = 0, TokenID = 5006 Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 RUN (20) Successfully plumbed mobile rule (ACL ID 255) **DHCP Process**

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 Assigning Address

192.168.100.105 to mobile

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP sending REPLY to STA
(len 416, port 1, vlan 100)

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP transmitting DHCP ACK (5)

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
op: BOOTREPLY, htype: Ethernet, hlen: 6, hops: 0

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
xid: 0xd3d3b6e9 (3553867497), secs: 0, flags: 0

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
chaddr: 00:1b:77:42:07:69

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
ciaddr: 0.0.0.0, yiaddr: 192.168.100.105

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
siaddr: 0.0.0.0, giaddr: 0.0.0.0

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 DHCP
server id: 1.1.1.1 rcvd server id: 192.168.100.254

PEM Process

Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 192.168.100.105 Added NPU
entry of type 1

!--- Client is now successfully associated to controller. !--- Type is 1; see the table in the [Client Traffic Forwarding](#) !--- section of this document. Wed Oct 31 10:46:25 2007: 00:1b:77:42:07:69 Sending a gratuitous ARP for 192.168.100.105, VLAN Id 100 !--- As address is known, gratuitous ARP is sent to notify.

Información Relacionada

- [Lightweight Access Point FAQ](#)
- [Preguntas Frecuentes sobre el Troubleshooting de los Controladores de WAN Inalámbricos \(WLC\)](#)
- [Preguntas y Respuestas del Módulo Cisco Wireless LAN Controller](#)
- [Regulador del Wireless LAN \(WLC\) FAQ](#)
- [Administración de Recursos de Radio en Redes Inalámbricas Unificadas](#)
- [Soporte de tecnología del Wireless LAN \(red inalámbrica \(WLAN\)\)](#)
- [Soporte Técnico y Documentación - Cisco Systems](#)