IEEE P802.11
Wireless LANs

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| Normative text for Differentiated Initial Link Setup |
| Date: 2013-03-08 |
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Abstract

The submission provides normative text for differentiated initial link setup as identified in 6.1.1 of the SFD ([11-12-0151-12-00ai-proposed-specification-framework-for-tgai](https://mentor.ieee.org/802.11/dcn/12/11-12-0151-12-00ai-proposed-specification-framework-for-tgai.docx)) as:

### 6.1.1 Link setup

FILS devices shall support differentiated initial link setup (11-12/0909r10).

**3.1 Definitions**

*Instructions to Editor: Append the Clause 3.1 with the following text:*

**initial link setup category (ILSC):** A label used by a station (STA) attempting to associate with an access point (AP) with high prioritiy.

**6.3.3.3 MLME-SCAN.confirm**

**6.3.3.3.2 Semantics of the service primitive**

*Instructions to Editor: Insert new rows in the corresponding tables as the following:*

Each BSSDescription consists of the elements shown in the following table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Type**  | **Valid range** | **Description** | **IBSS adoption** |
| Differentiated initial link setup information | Differentiated initial link setup information element includes ILSC information field and ILS Time field | As defined in8.4.2.ai | Differentiated initial link setup information includes ILSC information field and ILS Time field; This parameter is optional. | Do not adopt. |

Each BSSDescriptionFromFDSet consists of the following information items:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type**  | **Valid range** | **Description** |
| Differentiated initial link setup information | Differentiated initial link setup information element includes ILSC information field and ILS Time field | As defined in8.4.2.ai1 | Differentiated initial link setup information includes ILSC information field and ILS Time field; This parameter is optional. |

**8.3.3.2 Beacon frame format**

*Instructions to Editor: Insert the new row in the corresponding tables as follows:*

**Table 8-20 Beacon frame body**

|  |  |  |
| --- | --- | --- |
| ANA | Differentiated Initial Link Setup element  | The Differentiated Initial Link Setup element, as specified in 8.4.2.ai1, is optionally present when dot11FILSActiveated is true. |

**8.3.3.10 Probe Response frame format**

*Instrocutions to Editor: Insert a new row in the corresponding table as follows:*

**Table 8-27 Probe response frame body**

|  |  |  |
| --- | --- | --- |
| ANA | Differentiated Initial Link Setup element  | The Differentiated Initial Link Setup element, as specified in 8.4.2.ai1, is optionally present when dot11FILSActiveated is true. |

**8.5.8.34 FILS Discovery frame format**

*Instructions to Editor: Insert a new row in the corresponding table as follows:*

The FILS Discovery frame (FD) uses the Action Frame format. The format of its Action field is shown in

Table 8-221g.

**Table 8-221g — FILS Discovery frame action field format**

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| ANA | Differentiated Initial Link Setup element  | The Differentiated Initial Link Setup element, as specificed in 8.4.2.ai1, is optionally present when dot11FILSActiveated is true. |

**8.4.2.1 General**

*Instructions to Editor: Insert new rows in the corresponding tables as the following:*

**Table 8-54—Element IDs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Element**  | **Element ID** | **Length of indicated element (in octets)**  | **Extensible** |
| Differentiated Initial Link Setup Element ( see 8.4.2.ai1) | ANA | 4 | **Yes** |

**8.4.2.ai1** Differentiated Initial Link Setup element

*Instructions to Editor: Append the Clause 8.4.2.ai1 with the following text:*

The Differentiated Initial Link Setup element notifies STAs of initial link setup category (ILSC) that are allowed to associate with the AP in the following time duration. The Differentiated Initial Link Setup element contains four fields and it is optionally present in the Beacon, Probe Pesponse and FILS Discovery (FD) frames. The Differentiated Initial Link Setup element is defined in Fig. 8-ai\*\*01.

 **Figure 8-ai\*\*01 Differentiated Initial Link Setup element format**

|  |  |  |  |
| --- | --- | --- | --- |
| **Element ID** | **Length** | **ILSC Information** | **ILS Time**  |

 **Octets: 1 1 variable 1**

 **length**

The Element ID field is equal to the Differentiated Initial Link Setup element value in Table 8-54.

The Length field is 1 octet long. It specifies the length of Differentiated Initial Link Setup element in octets.

The ILSC Information field is of variable length, it indicates the initial link setup category (ILSC) STAs that are allowed to associate with the AP during the following time as indicated in the ILS Time field.

The ILSC Information field contains one ILSC Type bitmap subfield and at least one of the three optional subfields including ILS User Priority, Vendor Specific Category, and MAC Address Filter, as specified in Table 8-ai02.

**Figure 8-ai02 ILSC Information field format**

|  |  |  |  |
| --- | --- | --- | --- |
| **ILSC Type bitmap** | **ILS User Priority**  | **Vendor Specific Category**  | **MAC Address Filter** |

**Octets:**  1 0 or 1 0 or variable length 0 or 1

The ILSC type bitmap subfield is 1 octet in lengh as defined in Table 8-ai03. A bit value of 1 in the bitmap indicates that the corresponding ILSC subfield is present. When more than one bits are set to 1, a non-AP STA shall check all present ILSC subfields.

**Table 8-ai03 ILSC Type subfield format**

|  |  |
| --- | --- |
| **ILSC subfield bitmap** |  **Description** |
| **Bit 0** | **ILS User Priority** |
| **Bit 1**  | **Vendor Specific Category** |
| **Bit 2** | **MAC Address Filter** |
| **Bit 3 - 7** | **Reserved** |

The ILS User Priority subfield is defined in Table 8-ai04, and the ILS user priorities are mapped from user priority (UP) [1]. ILS user priority 2 refers to a STA with no traffic.

**Table 8-ai04 ILS User Priority subfields**

|  |  |  |
| --- | --- | --- |
| **Bit**  | **ILS User Priority**  | **Description**  |
| **Bit 0**  | **0** | **UP 4 - UP 7**  |
| **Bit 1**  |  **1** | **UP 0 – UP 3** |
| **Bit 2** |  **2** | **No Traffic** |
| **Bit 3-7** |  **NA** | **Reserved** |

The Vendor Specific Category subfield is defined in Table 8-ai05, which includes 1 byte length subfield, variable length OI subfield, and 1 byte Vendor Specific Category Bitmap subfield. .

**Table 8-ai05 Vendor Specific Category subfield format**

|  |  |
| --- | --- |
| **OI** | **Vendor Specific Category Bitmap** |

**Octets: variable length 1**

The OI subfield is defined in 8.4.1.31.

The Vendor Specific Category Bitmap subfield is defined in Table 8-ai06.

**Table 8-ai06 Vendor Specific Category Bitmap**

|  |  |
| --- | --- |
| **Bit**  | **Vendor Specific Category Description** |
| **Bit 0**  | **Category 0** |
| **Bit 1**  | **Category 1** |
| **Bit 2** | **Category 2** |
| **Bit 3-7** | **Reserved** |

The MAC Address Filter subfield is 1 octet in length as defined in Table 8-ai07. Bit 0 to Bit 3 indicate which bits of Bit 4 to Bit 7 are available for STA MAC address filtering.

**Table 8-ai07 MAC Address Filter subfield format**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Bit 0** | **Bit 1** | **Bit 2** | **Bit 3** | **Bit 4** | **Bit 5** | **Bit 6** | **Bit 7** |
| **0** | **0** | **0** | **1** | **Reserved** | **Available for MAC address filtering** |
| **0** | **0** | **1** | **1** | **Reserved** | **Available for MAC address filtering** |
| **0** | **1** | **1** | **1** | **Reserved** | **Available for MAC address filtering** |
| **1** | **1** | **1** | **1** | **Available for MAC address filtering** |
| **All other values are reserved** |

The ILS Time field is an unsigned integer that specifies the time, expressed in units of TUs beginning with the transmission of the frame with Differentiated Initial Link Setup element and ending after the ILS Time elapses, during which only the ILSC STAs that are indicated in ILSC Information field are allowed to attempt initial link setup with the AP; all categories of STAs can attempt initial link setup with the AP after this time expires.

**10.25.4** Differentiated Initial Link Setup

*Instructions to Editor: Append the Clause 10.25.4 with the following text:*

The differentiated link setup procedure provides a method for an AP to allow non-AP STAs of ILSC to associate with the AP to alleviate congestion and traffic peaks that may occur when excess initial links are set up simultaneously.

**10.25.4.1** AP procedures for differentiated initial link setup

*Instructions to Editor: Add the new Clause 10.25.4.1 with the following text:*

An AP with dot11FILSActivated equal to true may limit the number of STAs that are allowed to attempt association concurrently through the setting of the ILSC in the ILSC Information field of the Differentiated Initial Link Setup element.

If an AP receives initial link setup requests from STAs that are not allowed access at that time, the AP should ignore these requests.

**10.25.4.2 Non-AP STA procedures for differentiated initial link setup**

*Instructions to Editor: Add the new Clause 10.25.4.2 with the following text:*

When a non-AP STA with dot11FILSActivated equal to true receives a Beacon, Probe Response or FD frame including Differentiated Initial Link Setup element, the STA shall check the ILSC information subfield of the Differentiated Initial Link Setup element.

A STA is considered an ILSC STA that is allowed fast initial link setup only when it satisfies the condition specified in each and every optional subfield that is present in the ILSC information filed. If the STA does not satisfy one or more optional subfields present in the ILSC information field, then the STA is not considered an ILSC STA. A logical AND operation of all the conditions in the present optional subfields is used to determine whether the STA is an ILSC STA. The logical AND is not needed if only one optional subfield is present.

If ILS User Priority subfield is present, the STA shall check the bit position in the present subfield. A bit value of 1 in the bitmap indicates that the STA of the corresponding user priority is an ILSC STA that is allowed to attempt FILS with the AP. A bit value of 0 in the bitmap indicates that STAs of the corresponding User Priority are not allowed to attempt initial link setup before the time specified in the ILS Time field expires. If a STA carries more than one types of traffic, a STA identifies itself as an ILSC STA if any of the corresponding bit value is set to 1 in the ILS User Priority subfield.

If Vendor Specific Category subfield is present, a STA shall check the OI subfield first. If the STA can understand the OI subfield, the STA shall check the following Vendor Specific Category Bitmap. Otherwise, the STA shall skip and ignore the Vendor Specific Category subfield. A bit value of 1 in the bitmap indicates that a STA of the corresponding Vendor Specific Category is an ILSC STA and is allowed for fast initial link setup. Otherwise, a STA shall postpone the link setup by the specified ILS Time.

If MAC Address Filter subfield is present, a STA shall compare the corresponding LSBs of its MAC address with the available bits of Bit 4 to Bit 7 in MAC Address Filter subfield, with LSB comparing to Bit 7. If the STA’s corresponding LSBs of its MAC address are same as the available bits in MAC Address Filter subfield, the STA is allowed to attempt link setup. Otherwise, the STA shall postpone the link setup by the specified ILS Time.

Reference:

[1] IEEE Std 802.11-12, “Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications”, 2012.

**Motion-1:** To authorize the Editor to incorporate the text changes proposed in contribution 11-13-0264-00-00ai-normative-text-for-differentiated-initial-link-setup to the draft TGai Specification Document.

Yes: \_\_\_\_\_\_\_\_\_\_\_\_;  No: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_;  Abstain: \_\_\_\_\_\_\_\_\_\_\_\_\_

[Result of Motion]