IEEE P802.11  
Wireless LANs

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| Resolutions to IRM CIDs on D2.0 | | | | |
| Date: 2024 - January | | | | |
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Abstract

Resolutions to CIDs,

66, 67, 200, 201, 279, 202, 280, 219, 109, 107, 35, 112, 113, 55, 56, 220, 79, 71, 206, 36, 228, 143, 146, 60, 76, 77, 147, 229, 76, 77, 145, 46, 150, 231, 151, 152, 153, 47, 245, 10, 246, 156, 51, 232, 148, 233, 159, 234, 207, 161, 166, 44, 237

Rev 1 – added CIDs and corrected CIDs. Posted prior to first presentation.

Rev2 – mostly typos. Sorted CIDs 145, 46, 47 together.

CID 66, 67

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| 17 | 10 | The description of "identifiable random medium access control (MAC) address: [IRM] " is incomplete. | Suggest to change "IRM" to "IRMA" |
| 17 | 20 | The description of "identifiable random medium access control (MAC) address: [IRM] " is incomplete. | Suggest to change "IRM" to "IRMA" |

Either IRM or IRMA works, it comes down to the TG’s preference. Maybe a straw poll and then make the changes if TG decides on IRMA. However, we have lived with IRM for 2 years plus so will assume a reject.

The acronym IRM in 3.4 is clear, as is the definition in 3.2.

RESOLUTION CID 66 and 67

REJECT

The acronym IRM in 3.4 is clear, as is the definition in 3.2.

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CID 200, 201, 279

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| 18 | 16 | The text says "can provide a previously provided device ID or can use a previously provided MAC address", but the OR seems to be exclusive. Although it may not be that all will want to use IRM and DeviceID, this possibility should not be excluded by the text. | "can either provide a previously provided device ID or can use a previously provided MAC address (IRM), or both, either of which...: |
| 18 | 16 | The text says Use a previously provided MAC address (IRM), clarify that the MAC is IRM, otherwise the text is confusing, IRM has a name, let's use it. | "or can use a previously provided Identifiable Random MAC address (IRM)" |
| 18 | 16 | "MAC address" should be "Identifiable Random Medium Access Address" | As suggested |

Existing text is:

“Such a STA, when reconnecting to a network, can provide a previously provided device ID or can use a previously provided MAC address (IRM), either of which allows the network to recognize the STA ….”

Commenter (CID 200) is correct in that both can be used concurrently so inclined to accept the proposed change. CIDs 201 wants to clarify what the MAC address is. As this is the first time it is used in text, I agree, hence also ‘accept”. CID 279 is similar but slightly different wording.

RESOLUTIONS for CIDs 200 and 201

ACCEPT

Note to editor, the cited text is edited as follows:

“Such a STA, when reconnecting to a network, can either provide a previously provided device ID or can use a previously provided identifiable random MAC address (IRM), or both, either of which allows the network to recognize the STA ….”

RESOLUTIONS for CID 279

REVISED

Cited text at 18.15 to be as per CIDs 200 and 201:

“Such a STA, when reconnecting to a network, can either provide a previously provided device ID or can use a previously provided identifiable random MAC address (IRM), or both, either of which allows the network to recognize the STA ….”

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CID 202, 280

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| 18 | 18 | Providing a device ID or IRM does not mitigate the abilities of third parties to do tracking or traffic analysis. | "while not further enabling third party tracking or traffic analysis. |
| 18 | 18 | "third parties" is not well defined. | "third parties" only occurs in this draft and should be more clearly defined. Perhaps inclusion of more threat scenarios to make clear what the third parties might be. |

Text is

“…which allows the network to recognize the STA while mitigating the abilities of third parties to do tracking or traffic analysis.”

CID suggest changing to

“…which allows the network to recognize the STA while ~~mitigating the abilities of third parties to do~~ not further enabling third party tracking or traffic analysis.”

Problem with this is the term “not further”. Compared to what? The idea we are trying to get across is that we are making it more difficult to track or perform traffic analysis. Hence, the term “mitigate”.

CID 280 questions the use of “third party”. So the question is, how else can we refer to the “bad guy”?

Personally, I think “third” party is the best we will come up with so I propose to reject..

RESOLUTION for CID 202

REJECT

The term “while not further enabling” does not define in relation to what. The suggested text would require further text to explain what the “further enabling” is related to.

RESOLUTION for CID 280

REJECT

Third party is a well-known term and it is considered clear. No better alternative term to describe a “bad actor” is proposed.

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CID 219

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| 26 | 36 | In table Table 9-414a, the recognized part is not clear, especially based on the definition of the device ID which is provided by the network not the AP. So does the AP recognize the non-AP STA or does the network to which belongs the AP recognize the non-AP STA? I would just put in each respective row; "Indicates that the device ID has been recognized" and "Indicates that the device ID has not been recognized" Same comment applies to Table 9-414b for IRM | As in comment |

Agree with commentor, is it the AP or the network or the ESS? The AP is responsible for informing the STA but where is it actually recognized? All that really matters is that the non-AP STA knows if the ID was recognized.

RESOLUTION for CID 219

REVISED (accepted in principle).

Table 9-414a, edit the Meaning column as follows:

“Indicates that the device ID has been recognized ~~by the AP~~”.

“Indicates that the device ID has not been recognized ~~by the AP~~”.

Table 9-414b, edit the Meaning column as follows:

“Indicates that the IRM has been recognized ~~by the AP~~”.

“Indicates that the IRM has not been recognized ~~by the AP~~”.

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CID 109

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| 26 | 50 | "The IRM element contains a MAC address." is too generic | Change to "The IRM element contains a random identifiable MAC address." |

Actually the IRM element does not always contain an IRM, it is omitted when sent by an AP. Perhaps best to not say this at all.

RESULUTION for CID 109

REVISED

At P26.50 Delete “The IRM element contains a MAC address.”

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CID 107

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| 27 | 4 | Same comments about PCP and non-AP STA as for previous subclause | Make the same changes as proposed for that subclause |

Previous comment referred to was CID 103, P26.26

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| What if it's from PCP to non-AP STA? | Change "an AP" to "an AP or PCP" and in the table change "AP" to "AP/PCP" |

Note that “by the AP” in the table has been deleted by CID 219.

We do not mention PCP anywhere else so if we now add that to this, then we will be faced with including it in many other places? I don’t know.

**personal basic service set:** [PBSS] A directional multi-gigabit (DMG) basic service set (BSS) that includes one station (STA) that is in a PBSS control point (PCP), and in which access to a distribution system (DS) is not present.

**personal basic service set (PBSS) control point:** [PCP] An entity that contains one station (STA) and coordinates access to the wireless medium (WM) by STAs that are members of a PBSS.

I don’t recall any discussions on DMG during the TIG, SG or TG, hence inclied to reject.

RESOLUTION for CID 107

REJECT

DMG was not considered for RCM mitigation.

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CID 35

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| 27 | 25 | "The IRM field is reserved when sent from an AP to a non-AP STA." See P33.61/63 we decided that the field should not be present in this case, i.e., the IRM field is not present? | Change cited text to "The IRM field is not present when sent from an AP to a non-AP STA." and in Figure 9-1054b under "IRM" box change octets to "0 or 6" |

The commentor is correct.

RESOLUTION for CID 35

ACCEPT

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CID 112, 113

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| 28 | 17 | "associated or authenticated" -- doesn't it have to do both? | Delete "or authenticated" |
| 28 | 18 | "a new IRM" -- it is not clear what "new" means here | Change to "an IRM" |

Text is

“The Duplicate IRM frame is transmitted by an AP to a non-AP STA that associated or authenticated using PASN to the AP and provided a new IRM that the AP already has stored for another STA.”

CID 112 questions the “authenticated” in that to associatie a STA must first authenticate. However, in this context it is “authenticated using PASN”. Not sure if this is misleading. Could it be made clearer? Let’s try.

CID 113 has a point, and maybe the term “new” is not required.

RESOLUTIONS for CID 112 and 113

REVISED

At P28.17 make the following change:

“The Duplicate IRM frame is transmitted by an AP to a non-AP STA that associated or, when using PASN, authenticated ~~using PASN~~ to the AP and provided an ~~new~~ IRM that the AP already has stored for another STA.”

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CID 55, 56

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| 28 | 32 | When sent by the AP, the IRM Action field is always 0 (duplicate), so why not say so and make it clear? | Replace "The IRM Action field is defined in Table 9-640a (IRM Action field) in 9.6.35.1 (General)." with "The IRM Action field is set to 0 to indicate Duplicate IRM, as defined in Table 9-640a (IRM Action field) in 9.6.35.1 (General)." |
| 28 | 50 | When sent by the AP, the IRM Action field is always 1 (new IRM), so why not say so and make it clear? | Replace "The IRM Action field is defined in Table 9-640a (IRM Action field) in 9.6.35.1 (General)." with "The IRM Action field is set to 1 to indicate New IRM, as defined in Table 9-640a (IRM Action field) in 9.6.35.1 (General)." |

Although this is my comment, on reflection I don’t think it is needed.

RESOLUTION for CIDs 55, 56

REJECT

The reference to the Table is sufficient.

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CID 220

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| 29 | 30 | "The two mechanisms, device ID and IRM, may be used concurrently." Is is not clear what happens if DeviceID and IRM are used together, but for whatever reason network responds "recognized" to one and "not recognized" to the other. Clarification should be added to specify the behavior of the non-AP STA. My preference would be that the non-AP STA should assumed to be non-recognized. Or maybe the easiest way would be to not use them altogether? | The situation where both schemes are used and give contradicting recognition result should be clarified, at least for the non-AP STA behavior. I don't have strong opinion, either do not allow both schemes to be used together or always assume a non-recognized state by the STA, which should reassociate using one scheme only |

Each of the two schemes work independently. If the device ID is not recognized and the IRM is, then the STA knows exactly what the situation is. Similarly, vice versa. There is nothing to stop a STA using both schemes, in fact, it may be useful - the IRM is a temporary MAC address, and device ID can be a permanent identitification. Their use is independent.

RESOLUTION for CID 220

REJECT

Each of the two schemes works independent of the other. A STA will use each in a very different way. There is nothing to prevent both schemes being used concurrently.

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CID 79

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| 30 | 22 | "(different from the address it is using)" is vague about how/where/when this address is being used. | Change to "(different from the MAC address it is currently using as it's TA)" |

Text is

“The second mechanism, referred to as IRM, has the non-AP STA provide a random MAC address (different from the address it is using) to the AP during association or PASN authentication…”

No harm in clarifying that this is the TA

RESOLUTION for CID 79

ACCEPT

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CID 71, 206

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| 30 | 23 | The description of "use that MAC address for the next association or PASN authentication..." is confusing. | Suggest to change "use that MAC address for the next association or PASN authentication..." to "use that MAC address for identification of the STA during the next association or PASN authentication..." |
| 30 | 23 | Why would the use of IRM be restricted and forbidden for 'between associaiton' exchanges? For example, the STA may want to be recognized when running FTM measurements to a given AP, even if the STA is not (re)associated yet to that AP. Also, 'for the next associaiton or PASN authentication" seems to wriongly indicate that the STA cannot use the MAC beyond these exchanges. | replace last line with "and then use that MAC address for its next exchnages with that AP, pre-assocaiton exchnages, PASN authenticaiton, and/or associaiton and associagted exchanges". |

Full text is:

“The first mechanism, referred to as device ID, has the AP provide an identifier to the non-AP STA during association or PASN authentication that the non-AP STA can them report back to the AP during a future association or PASN authentication. The second mechanism, referred to as IRM, has the non-AP STA provide a random MAC address (different from the address it is using) to the AP during association or PASN authentication and then use that MAC address for the next association or PASN authentication”

Suggested changes are

use that MAC address for identification of the STA during the next association or PASN authentication..."

and then use that MAC address for its next exchnages with that AP, pre-assocaiton exchnages, PASN authenticaiton, and/or associaiton and associagted exchanges.

The first part of the cited sentence explains clearly that “that MAC address” is the “random MAC address”. Hence it should not be confusing. However…

This is the outline of the two schemes and hence is trying to be concise. CID 71 adds that the MAC Address is used for identification and this is true, so inclined to accept that insertion. CID 206 spells out the details and is correct. Will attempt to combine them.

RESOLUTION for CID 71 and 206

REVISED

At P30.23,

Replace

“and then use that MAC address for the next association or PASN authentication”

With

“and then use that MAC address for identification of the STA, during its next pre-association exchanges, PASN authentication, and/or association and associated exchanges with that AP.”

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CID 36

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| 30 | 31 | "NOTE--Device ID and IRM are independent schemes that allow an AP to recognize a non-AP STA prior to association and identify it during association respectively." Wrong way round. IRM is the pre-association. Invert it | Replace cited text with "NOTE--IRM and device ID are independent schemes that allow an AP to recognize a non-AP STA prior to association and identify it during association respectively." |

The commentor is correct.

RESOLUTION for CID 36

ACCEPT

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CID 228

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| 32 | 58 | IRM operation is missing AP advertising support of IRM in specific frames. | Add this sentence (preferably at the beginning of 12.2.12.2 Identifiable random MAC address (IRM) operation): An AP that has dot11IRMActivated equal to true advertises support of the IRM mechanism by setting the IRM Active field to 1 in the Extended RSN Capabilities field (see 9.4.2.240 (RSNXE)) in Beacon and Probe Response frames. (see the reference line for advertising support of device ID - Line39-41) |

Yes, commentor is correct. The IRM text was changed to be similar to the device ID text. The opening clause is missing.

RESOLUTION for CID 228

ACCEPT

Note to Editor:

Add following at beginning of clause 12.2.12.2.

“An AP that has dot11IRMActivated equal to true advertises support of the IRM mechanism by setting the IRM Active field to 1 in the Extended RSN Capabilities field (see 9.4.2.240 (RSNXE)) in Beacon and Probe Response frames.”

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CID 143

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| 32 | 62 | "sent to any AP in an ESS that has dot11IRMActivated equal to true" suggests not all APs in the ESS have to have RM activated, but I had understood they all did | Delete "in an ESS" |

Agree with commentor.

RESOLUTION for CID 143

ACCEPT

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CID 146

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| 33 | 18 | "An IRM is a 48-bit address" should be "An IRM is a MAC address" | As it says in the comment |

Agree with commentor.

RESOLUTION for CID 146

ACCEPT

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CID 60

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| 33 | 20 | "A non-AP STA should generate the IRMs on a random basis such that a non-AP STA cannot be identified by a third party from the TA it is using." I'm not sure the second part of the sentence is needed. Random is random and a STA couuld not select a special random to accomplish the third party criteria. Suggest delete " such that a non-AP STA cannot be identified by a third party from the TA it is using" | delete " such that a non-AP STA cannot be identified by a third party from the TA it is using" |

Agree with commentor.

Just say “"A non-AP STA should generate the IRMs on a random basis.”

RESOLUTION for CID 60

ACCEPT

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CIDs 76, 77, 147, 229

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| 33 | 23 | "The non-AP STA may then use that IRM as its TA ..." indicates that the IRM is used as the TA only after completing the association. The TA to use in first association to the ESS, prior to sending the IRM to the AP is not specified. | Clarify what MAC address is to be used when initially joining an ESS. |
| 33 | 23 | Conflicting statements about when an IRM shall be sent. Line 23 says "Each time ... it provides a new IRM" but line 30 says "may provide a new IRM". | Unify these two paragraphs. Either a new IRM is required on every association, or it isn't. |
| 33 | 23 | "during the RSN association" should be just "during association" | As it says in the comment |
| 33 | 23 | This paragraph is missing PASN case. | Add this sentences at the end of this paragraph: Similarly, each time the non-AP STA authenticates using PASN with an AP in an ESS, it provides a new IRM to the AP during the PASN to be shared with all the APs in the ESS. The non-AP STA may then use that IRM as its TA the next time it requests authentication using PASN to any AP in that same ESS. |

Cited paragraph is:

“Each time the non-AP STA associates with an AP in an ESS, it provides a new IRM to the AP during the RSN association to be shared with all the APs in the ESS. The non-AP STA may then use that IRM as its TA the next time it requests association to any AP in that same ESS. The non-AP STA may also use that IRM as its TA for any probes, directed or broadcast, public action frame, authentication and (re)association frame, that it may transmit when it intends to be identified.”

CID 76 is confused about when the TA is used. It seems clear that “*The non-AP STA may then use that IRM as its TA the next time it requests association to any AP in that same ESS.”* I don’t see a confusion. Inclined to reject this.

RESOLUTION for CID 76

REJECT

The text clearly states that the STA uses the IRM as its TA the next time it associates. It does not change TA after association.

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CID 77 points out new IRM provided “each time” (right at the start), but then in next paragraph it says “may”. This does need to be addressed.

RESOLUTION for CID 77

REVISED

At P33.23 make edit as follows:

“Each time the non-AP STA associates with an AP in an ESS, it ~~provides~~ may provide a new IRM to the AP…”

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CID 147 wants to remove RSN from “RSN Association”. The intention of using “RSN” is to make it clear that the IRM is provided during the handshake or FILS and not as part of the association request response. Prefer to keep it.

RESOLUTION for CID 147

REJECT

The intention is to make it clear that the IRM is provided securely during the handshake or FILS and not as part of the association request response.

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CID 150 correctly points out that the PASN case is missing. However, this is intentional, the PASN case is dealt with in the next para. To include it here would be a nightmare.

RESOLUTION for CID 229

REJECT

CID 229 correctly points out that the PASN case is missing. However, this is intentional, the PASN case is dealt with in the next para.

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CID 145

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| 32 | 16 | "NOTE 1--The IRM Active field should be configured consistently throughout the ESS." duplicates the previous para | Delete the cited text |

Referred to text is at 33.16

Correct operation of the IRM mechanism depends on all APs in the ESS being configured with dot11IRMActivated set to true. Support of the IRM mechanism needs to be advertised by all APs in an ESS in Beacons and Probe Response frames.

NOTE 1—The IRM Active field should be configured consistently throughout the ESS.

Yes, it does seem to be a repetition but it is also important that the IRM list is consistent throughout the ESS. There are other CIDs on this and how it is accomplished. I think we need to change NOTE 1. Do we need similar for Device ID? See CID 46.

RESOLUTION for CID 145

REVISE

At 33.16 change NOTE 1 to read:

“NOTE 1 -The exact criteria and mechanism to distribute IRMs throughout the ESS is out of scope for this standard.”

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CID 46

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| 33 | 24 | Two questions regarding sharing an IRM with all the APs in the ESS: 1) Does the correct operation of the IRM mechanism requires all the APs in the ESS know all the active IRMs of the ESS? 2) How do the other APs in the ESS know a new IRM provided by a non-AP STA to its associated AP during assoication? | Please address the questions asked in this comment. If the asnwer to Question 2) is out of scope of this sepc, it may be a good idea to make it clear, e.g., having some text like "It is out of scope of this standards to specify how an IRM is shared among the APs in the ESS." |

Correct reference is 33.11

Yes, the correct operation for efficient use of IRM would require all APs in the ESS having the same list of IRMs. This is stated at P33.11 (see CID 145).

How do the otjher APs know, or exchange this information? How does or did an ESS know the MAC Address of a STA that is returning before RCM? When this text and NOTE 1 was discussed in the TG, it was understood that the method of APs talking to each other in an ESS over the DS is not defined. I seem to remember the same discussion in FT. Does FT have an “out of scope” text?

**At P550.33 in 11me 4.0 we have**

“Describing the DS itself or the functions thereof is out of scope of this standard.”

Propose same resolution as CID 145.

RESOLUTION for CID 46

REVISE

At 33.16 change NOTE 1 to read:

“NOTE 1 -The exact criteria and mechanism to distribute IRMs throughout the ESS is out of scope for this standard.”

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CID 47

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| --- | --- | --- | --- |
| 33 | 37 | How does an AP know if the new IRM is already in use within the IEEE 802 LAN, or identical to a most recently received IRM for another non-AP STA? Also, if an IRM is used in the domain of an ESS, then does it mean "the IEEE 802 LAN" is "the ESS"? | Please address the questions asked in this comments. |

How does an AP know if the new IRM is already in use within the IEEE 802 LAN? How does or did an ESS know the MAC Address of a STA that is retiurning before RCM? If the ESS wanted to identify STAs then it would save the MAC Address. With IRM it does the same thing except the address is changing. The term IEEE 802.11 LAN was discussed in the TG for some time and was preferred to ESS as it includes the DS and this was felt to be more accurate.

RESOLUTION for CID 47

REVISE

At 33.16 change NOTE 1 to read:

“NOTE 1 -The exact criteria and mechanism to distribute IRMs throughout the ESS is out of scope for this standard.”

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CID150

|  |  |  |  |
| --- | --- | --- | --- |
| 33 | 24 | "may then use that IRM as its TA" -- shouldn't it be more than a "may"? | As it says in the comment |

Text is:

“Each time the non-AP STA associates with an AP in an ESS, it provides a new IRM to the AP during the RSN association to be shared with all the APs in the ESS. **The non-AP STA may then use that** IRM as its TA the next time..”

The “may” is used because it is not mandatory that the STA does use the IRM as its TA. It only does that if it wants to be recognized, and hence it is still an option for the STA. I take the point of the comment however, and maybe we can make it a bit stronger?

RESOLUTION for CID 150

REVISE

At P33.24 change “The non-AP STA may then use…” to ““The non-AP STA should then use…”

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CID 231

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| --- | --- | --- | --- |
| 33 | 30 | This paragraph talks about Association Request. However, PASN does not have Association Request. Therefore, "the AP shall include an IRM element in the second PASN frame." does not apply here. | Modify the paragraph like this:  A non-AP STA indicates support for the IRM mechanism in a (Re-)Association Request frame or in first PASN frame and the AP indicates support for the IRM mechanism in the corresponding (Re-)Association Response frame or in second PASN frame. If a non-AP STA indicates support for the IRM mechanism in an Association Request frame or first PASN frame and the AP indicates support for the IRM mechanism in the corresponding Association Response frame or second PASN frame, then the AP shall include an IRM KDE in message 3 of the 4-way handshake or, if using FILS authentication, the AP shall include an IRM element in the Association Response frame or if using PASN authentication, the AP shall include an IRM element in the second PASN frame. |

Existing text:

“When associating to an AP that advertises support for IRM, the non-AP STA may provide a new IRM to the AP by including an IRM KDE in message 4 of the 4-way handshake or, when using FILS authentication, including the IRM element in the Association Request frame. When using PASN, the non-AP STA may provide a new IRM to the AP by including the IRM element in the third PASN frame.”

Suggested text is:

“A non-AP STA indicates support for the IRM mechanism in a (Re-)Association Request frame or in first PASN frame and the AP indicates support for the IRM mechanism in the corresponding (Re-)Association Response frame or in second PASN frame. If a non-AP STA indicates support for the IRM mechanism in an Association Request frame or first PASN frame and the AP indicates support for the IRM mechanism in the corresponding Association Response frame or second PASN frame, then the AP shall include an IRM KDE in message 3 of the 4-way handshake or, if using FILS authentication, the AP shall include an IRM element in the Association Response frame or if using PASN authentication, the AP shall include an IRM element in the second PASN frame.”

Looks good to me.

RESOLUTION for CID 231

ACCEPT

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CID 151, 152, 153

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| --- | --- | --- | --- |
| 33 | 36 | "within the IEEE 802 LAN" -- exactly what is this referring to? The BSS? The BSS and anything that is directly accessible from the DS? | Clarify |
| 33 | 36 | "a most recently received IRM" -- there can only be one most recently received | Change to "the most recently received IRM" |
| 33 | 36 | Don't all the "may"s in this para need to be shoulds or shalls? | As it says in the comment |

Existing text is:

“If the new IRM is already in use within the IEEE 802 LAN, or identical to a most recently received IRM for another non-AP STA, then, after association or authentication using PASN, the AP may send…”

CID 151. The TG debated for some time on where the IRMs are stored or used. This term was the consensus. Hesitant to have that discussion again as it will consume many minutes.

RESOLUTION for CID 151

REJECT

The TG debated for some time on where the IRMs are stored or used. This term was the consensus.

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RESOLUTION for CID 152

ACCEPT

Note to editor, at P33.36:

“If the new IRM is already in use within the IEEE 802 LAN, or identical to ~~a~~ the most recently received IRM..”

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RESOLUTION for CID 153

REJECT

IRM is not mandatory and even if supported the STA may chose not to use it. So ‘may’ is correct usage.

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CID 245

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| --- | --- | --- | --- |
| 33 | 38 | If a duplicate IRM is detected by the AP, it doesn't make sense for it not to notify the non-AP STA. Hence, I think this requirement should be a "shall" requirement, contingent on the AP opting in to supporting IRM. | Replace: "... after association or authentication using PASN, the AP may send a Duplicate IRM frame ..." With: "... after association or authentication using PASN, the AP shall send a Duplicate IRM frame ..." |

Agree wih commentor.

RESOLUTION for CID 245

ACCEPT

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CID 10

|  |  |  |  |
| --- | --- | --- | --- |
| 33 | 38 | "the AP may send a Duplicate IRM frame" is not complete. Is there any other action the AP could do to handle the error case? | Add "Or the AP may reject the association or authentication" |

Agree.

As per CID 245, it is now a “shall”. At this point the 4 way HS or FILS or PASN has completed. It is considered that the AP should not reject the STA as it would not know why. Telling it the problem is the best approach.

RESOLUTION for CID 10

REVISE

See CID 245

“the AP ~~may~~ shall send a Duplicate IRM frame”

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CID 246

|  |  |  |  |
| --- | --- | --- | --- |
| 33 | 40 | The use of "which provides" is very awkward. As a New IRM frame, does provide a new IRM to the AP. Also, the IRM is provided to the ESS via the AP, so it is clearer to state it is provided to the ESS. Also, it could be clearer that the New IRM frame is sent after the receipt of a Duplicate IRM frame. | Replace: "The non-AP STA may then respond with a New IRM frame (see 9.6.35.3 (New IRM)) which provides a new IRM to the AP." With: "A non-AP STA that receives a Duplicate IRM frame may transmit a New IRM frame (see 9.6.35.3 (New IRM)) to provide a new IRM to the ESS." |

Existing text is:

“The non-AP STA may then respond with a New IRM frame (see 9.6.35.3 (New IRM)) which provides a new IRM to the AP.”

The New IRM frame is sent to the AP not the ESS so it would be incorrect to say otherwise. The “which provides” is consistent with the wording elsewhere. The term “provide” an IRM (or a devie ID) is used consistently.

RESOLUTION for CID 246

REJECT

The New IRM frame is sent to the AP not the ESS so it would be incorrect to say otherwise. The “which provides” is consistent with the wording elsewhere. The term “provide” an IRM (or a devie ID) is used consistently

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CID 156

|  |  |  |  |
| --- | --- | --- | --- |
| 33 | 49 | Start of para covers reassoc but then it only covers assoc | As it says in the comment |

Yes, this is deliberate. The IRM is not used in a reassociation (it can’t be as there is no handshake), BUT the support for IRM is contained in the reassociation and association request frames.

RESOLUTION for CID 156

REJECT

Yes, this is deliberate. The IRM is not used in a reassociation (it can’t be as there is no handshake), BUT the support for IRM is contained in the reassociation and association request frames.

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CID 51

|  |  |  |  |
| --- | --- | --- | --- |
| 33 | 59 | It makes sense that to allow IRM to be used across all APs in an ESS. However for that solution to function properly there needs to be an assumption that somehow, all AP's can recognize the IRM for a STA | In order for an AP in an ESS to "recognize" the IRM, there needs to be a a mechanism to distribute or provide centralized query of the the IRM values. The mechanism can be beyond the scope of the standard, but the behavior should be captured somewhere. |

This was debated at some length, but it considered that the text at P33.11 covers the need for the ESS to be configured correctly. NOTE 1 did also state this. NOTE 1 is proposed to be changed in CIDs 145 and 46

RESOLUTION for CID 51

REVISE

At 33.16 change NOTE 1 to read: “NOTE 1 -The exact criteria and mechanism to distribute IRMs throughout the ESS is out of scope for this standard.”

*Note to editor – same resolution as CIDs 145 and 46.*

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CID 232

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| --- | --- | --- | --- |
| 33 | 59 | This paragraph lacks PASN case. | Change this sentence  "The non-AP STA, on receipt of an IRM Status field of value 1, indicating that the AP has not recognized the IRM, may either continue to associate to the AP and optionally provide a new IRM in an IRM KDE in message 3 of the 4-way handshake or, when using FILS authentication optionally provide an IRM element in the Association Request frame, or disassociate."  To  "The non-AP STA, on receipt of an IRM Status field of value 1, indicating that the AP has not recognized the IRM, may either continue to associate or authenticate using PASN to the AP and optionally provide a new IRM in an IRM KDE in message 3 of the 4-way handshake or, when using FILS authentication optionally provide an IRM element in the Association Request frame, or when using PASN authentication optionally provide an IRM element in the third PASN frame, else disassociate/deauthenticate." |

Not line 59. Line 63

Existing

“The non-AP STA, on receipt of an IRM Status field of value 1, indicating that the AP has not recognized the IRM, may either continue to associate to the AP and optionally provide a new IRM in an IRM KDE in message 3 of the 4-way handshake or, when using FILS authentication optionally provide an IRM element in the Association Request frame, or disassociate.”

Proposed

“The non-AP STA, on receipt of an IRM Status field of value 1, indicating that the AP has not recognized the IRM, may either continue to associate or authenticate using PASN to the AP and optionally provide a new IRM in an IRM KDE in message 3 of the 4-way handshake or, when using FILS authentication optionally provide an IRM element in the Association Request frame, or when using PASN authentication optionally provide an IRM element in the third PASN frame, else disassociate/deauthenticate.”

RESOLUTION for CID 232

ACCEPT

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CID 148

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| --- | --- | --- | --- |
| 33 |  | "as its TA" (3x) is not clear | Change to "in the Address 2 field of frames it transmits" |

Hmm…I thought TA was acceptable. I leave this one open to a straw poll.

RESOLUTION for CID 148

REJECT or ACCEPT

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CID 233

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| --- | --- | --- | --- |
| 34 | 1 | IRM is provided in IRM KDE in message 4 of the 4-way handshake. This line says message 3 of the 4-way handshake. "..continue to associate to the AP and optionally provide a new IRM in an IRM KDE in message 3 of the 4-way handshake." | Change "message 3 of the 4-way handshake" to "message 4 of the 4-way handshake" |

RESOLUTION for CID 233

ACCEPT

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CID 159, 234

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| --- | --- | --- | --- |
| 34 | 9 | "an Authentication Request frame" -- no such frame | Delete "Request" |
| 34 | 10 | This sentence says "Authentication Request". There is no such frame. | Only write "Authentication frame". |

RESOLUTION for CID 159 and 234

ACCEPT

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CID 207

|  |  |  |  |
| --- | --- | --- | --- |
| 34 | 20 | Why does the Standard restrict the way a STA should use its own MAC address? Maybe the STA wants to use it for FTM (jn state 1 and 2) or for other exchanges (like probing) and YET wants to eb recognized somehow. It may be the choice of most implementations to restrict the exchanges for auth/assoc, but why would the spec limit the STA freedom? | Delete the first sentence |

The intention is to point out that using the IRM in probes might expose it, and hence it is advisable not to do so. This is, however, covered in the text (only use in probes if STA wants to be identified or is in the vicinity of the AP). So I might well agree with the commentor.

RESOLUTION for CID 207

ACCEPT

Note to editor:

**At P34.20 delete “**In State 1 and State 2 (see 11.3.1 State Variables), the IRM ought to be used only in Authentication and Association Request/Response frames, respectively.”

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CID 161

|  |  |  |  |
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| 34 | 24 | "distinct neighbor reports" -- what is an indistinct neighbor report? | Delete "distinct" |

Looks good to me.

RESOLUTION for CID 161

ACCEPT

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CID 166

|  |  |  |  |
| --- | --- | --- | --- |
| 34 | 27 | This subclause has nothing about encryption of an IRM element | Add the missing text |

Text is

“When using PASN authentication, the Device ID element shall be encrypted in PASN frame 2 (if present) **and then IRM element shall be encrypted in PASN frame 3** (if present) with the negotiated key wrap algorithm (see Table 12-11-Integrity and key wrap algorithms).”

Commentor must have missed the IRM bit.

However, there is a typo, “then” should be “the”.

RESOLUTION for CID 161

REVISE

At P34.31, edit as follows:

When using PASN authentication, the Device ID element shall be encrypted in PASN frame 2 (if present) and ~~then~~ the IRM element shall be encrypted in PASN frame 3 (if present)…”

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CID 44

|  |  |  |  |
| --- | --- | --- | --- |
| 35 | 27 | Figure 12-47b. Octets for IRM should be "0 or 6" | Change "6" to "0 or 6" |

This is correct. The IRM filed is omitted if sent by the AP.

RESOLUTION for CID 44

ACCEPT

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CID 237

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| --- | --- | --- | --- |
| 37 | 44 | P33L56 mentions "... if using PASN authentication, the AP shall include an IRM element in the second PASN frame." Second PASN frame does not contain IRM element. | Add IRM element to the second PASN frame. |

The cited text is incorrect. The IRM element is included in the third PASN frame, not the second. At 33.56 we need to correct this.

RESOLUTION for CID 237

REVISE

At P33.57 edit as follows:

“…AP shall include an IRM element in the ~~second~~third PASN frame.”

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