Interoperability Insights

Post-Certification Learnings

Gaurav Jain
Wi-Fi Alliance

October 2025

Wi-Fi CERTIFIED® shows the difference

4Q 2024 Wi-Fi 7 Interop Event Excerpt

Feature	Test Scenario	Successful	Unsuccessful
MLO	2 link operation	92	13
	3 link operation	44	6
MLO EMLSR	Interoperability of Wi-Fi 7 AP and STA using EMLSR mode	61	12
Compatibility with Wi-Fi 7	Interoperability of legacy APs with Wi-Fi 7 STAs	90	0
MLO and MBSSID	Wi-Fi 7 device that uses M-BSSID to discover a 6 GHz SSID	38	10
320 MHz	Wi-Fi 7 device operation in 6 GHz with 320 MHz	25	2
MCS 13	Wi-Fi 7 device using MCS 13	51	2

“

Wi-Fi CERTIFIED devices performed better than non-certified devices; all unsuccessful results were from non-CERTIFIED devices.

Interoperability Insights, April 2025

Maintaining interoperability is an ongoing challenge

Wi-Fi (MAC/PHY)

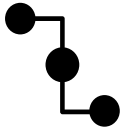
Wi-Fi 6 CERTIFIED

Wi-Fi 7 CERTIFIED

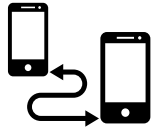
Security

WPA3™

Alternative Topologies



Wi-Fi Direct®



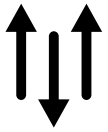
Wi-Fi Aware™

Performance

Wi-Fi Device Metrics

Network Management

Wi-Fi Agile Multiband™



Wi-Fi QoS Management™

- Baseline interoperability is established at Wi-Fi CERTIFIED launch
- Initial certification is foundational but not final
- New challenges emerge post-launch as the ecosystem remains dynamic, fragmented, and constantly evolving
- Certification must evolve to keep pace with real-world deployment realities
- Wi-Fi Alliance is reaching out to the broader industry to collaborate in tracing interoperability variability

Wi-Fi 7 MLO-related interoperability insights

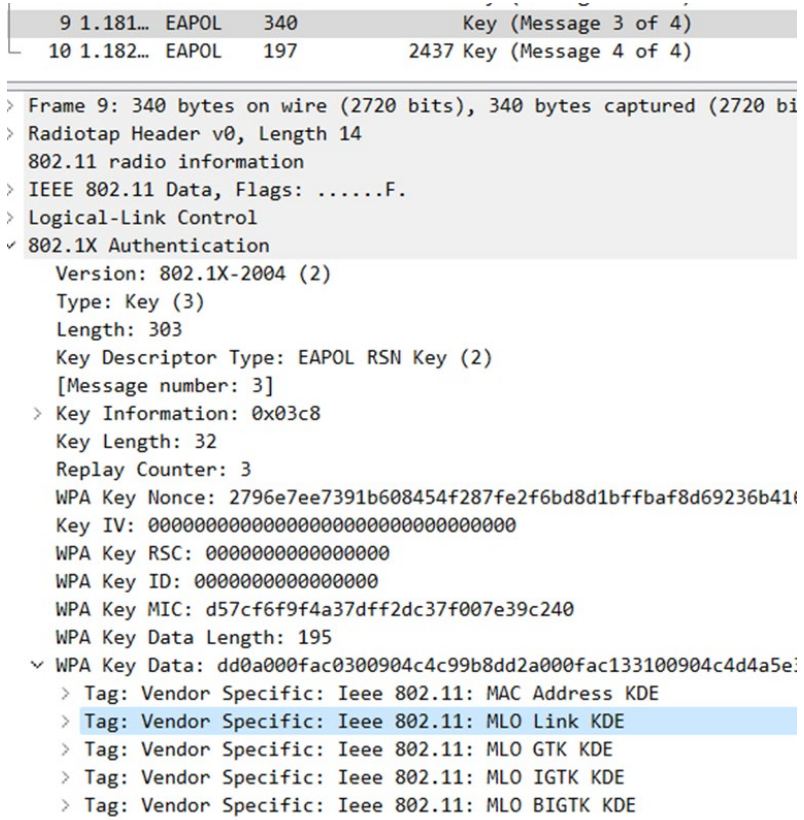
Feature area
MLO Link KDE

Problem
STA device implementation issue may exist with the interpretation of affiliated links vs. requested links

Observation
STA fails to complete EAPOL exchange after receiving M3 from AP citing more MLO Link KDEs received than expected

Impact
Association failure

Resolution
Wi-Fi CERTIFIED testing updated to validate STA connects to an AP with MLO Link KDEs for all affiliated links or only for the negotiated links in M3



Wi-Fi 7 MLO-related interoperability insights

Feature area

Extended MLD Capabilities And Operations subfield; subfield as defined in IEEE 802.11be D7.0 provides signaling capabilities to AP and STA for certain MLO features

Problem

Device implementation issue may exist in processing frames from STA/AP including this subfield

Observation

- Affected AP failed to parse Association Request when STA includes this subfield
- Affected STA failed to initiate connection when AP includes this subfield in Beacon/Probe Response

Impact

Association failure

Resolution

Wi-Fi CERTIFIED testing revised to validate STA and AP undergoing certification ignore unsupported capabilities signaling and proceed with the connection

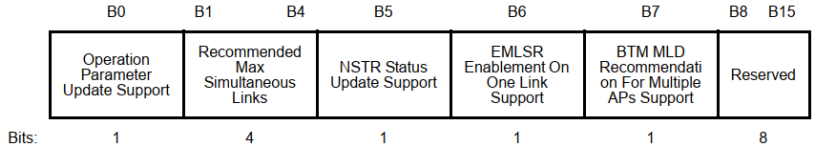


Figure 9-1074t—Extended MLD Capabilities And Operations subfield format

Subfield	Definition	Encoding
Operation Parameter Update Support	Indicates support of operation parameter update negotiation.	Set to 1 if dot11OperationParameterUpdateImplemented is true. Set to 0 otherwise. See 35.3.6.6 (Non-AP MLD operation parameter update).
Recommended Max Simultaneous Links	Recommended maximum number of enabled links that a non-AP MLD can operate on for simultaneous frame exchanges.	Reserved when carried in a frame that is not a Beacon frame or a broadcast Probe Response frame. Indicates the recommended maximum number of enabled links on which a non-AP MLD can operate on for simultaneous frame exchanges. A value of 0 indicates that the AP MLD does not advertise any such limit. The value 1 is reserved. See 35.3.7.1 (General).
NSTR Status Update Report	Indicates support of NSTR status update procedure.	Set to 1 if dot11NSTRStatusUpdateImplemented is true. Set to 0 otherwise. See 35.3.16.2 (MLD capability and operation signaling).
EMLSR Enablement On One Link Support	Indicates that an AP MLD supports the enablement of the EMLSR operation with a single bit position of the EMLSR Link Bitmap subfield of the EML Operating Mode Notification frame set to 1.	For an AP MLD: Set to 1 if dot11EHTEMLSREnablementOnOneLinkImplemented is true. Set to 0 otherwise. For a non-AP MLD: Reserved.
BTM MLD Recommendation For Multiple APs Support	Indicates whether or not a non-AP MLD supports receiving a BTM Request frame with a Neighbor Report element with a Basic Multi-Link element that includes one or more Per STA Profile subelement(s) providing recommended links for an AP MLD.	For a non-AP MLD: Set to 1 if dot11EHTBTMMLDRecommendationForMultipleAPsImplemented is true. Set to 0 otherwise. For an AP MLD: Reserved

Table 9-417o—Subfields of the Extended MLD Capabilities and Operations subfield

Wi-Fi 7 MLO-related interoperability insights

Feature area

MCS15 Disable; subfield as defined in 802.11be D6.0 allows AP and STA to indicate support for the reception of EHT PPDU with MCS 15

Problem

AP and STA not aligned with the specification carry the risk of *not* honoring the MCS15 Disable indication and transmit EHT PPDUs with EHT-MCS 15 regardless

Observation

Issue-prone AP/STA device adapted its rate down to MCS 15, but the peer (STA/AP with MCS15 Disable bit set to 1) was unable to successfully receive these PPDUs

Impact

Sustained failure to recover from MCS 15 (lowest MCS) leads to **persistent link degradation and unstable connectivity** even under improved channel/network conditions

Resolution

Wi-Fi CERTIFIED testing updated to validate a device do not transmit EHT PPDU at MCS 15 when peer indicates no support for MCS 15 reception

STA signaling in EHT OM Control subfield

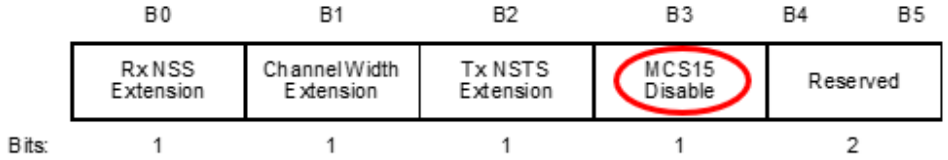


Figure 9-33a—Control Information subfield format in an EHT OM Control subfield

AP signaling in EHT Operation element

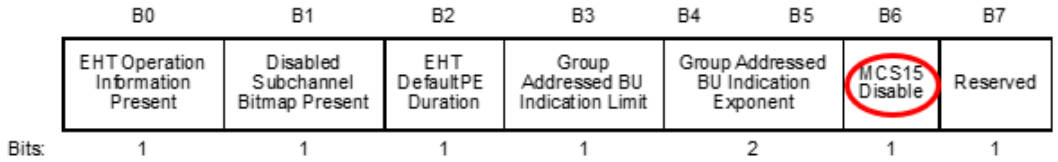


Figure 9-1074j—EHT Operation Parameters field format

Under assessment: what to watch out for in three feature areas

1

MLO BA agreement

The ADDBA responder allowed to send the response through an affiliated AP on an enabled link different from the one ADDBA Request was received on — potential impact to MLO STR operation.

2

MLO maintained on non-recommended link using link switch

Unlike the non-MLO case where following BTM with NR, STA always roam to another AP and can only return to non-recommended AP via (re)association, in an MLO case a non-AP MLD could come back to non-recommended link before allowed using link switch operation.

3

Beacon Protection with Wi-Fi 6 and previous generation STA devices

STA connects successfully but disconnects and goes into constant connect-disconnect loop when beacon protection is enabled on AP. At present, one not certified Wi-Fi 6 commercial client has been tagged to have this issue.

Current State of Affairs with WPA3-Personal Transition Mode

Deployment Challenges

- Most known issues stem from **deployed implementations failing to handle protocol extensions**
- The problem is more prevalent in operator networks with diverse client populations
- For example,
  - Some legacy STAs cannot connect if the AP advertises **more than 1–2 AKMs** (particularly WPA3-Personal transition mode)
  - Some STAs fail to connect if the AP advertises **multiple pairwise cipher suites**
  - Some STAs fail to process **additional KDEs in EAPOL-Key**

Practical Mitigation Path

- **WPA3-Personal compatibility mode** provides a practical solution, especially for **residential and operator-managed deployments**
- Ensures **legacy STAs maintain connectivity** even when APs support multi-AKM/new AKMs or multiple cipher suites
- Allows **newer STAs** to connect seamlessly using **WPA3-Personal**

Interop Insights – Roaming landscape has improved

2Q 2025 Roaming Interop Event Excerpt

Roaming Test Scenario	Successful	Unsuccessful
Roaming between WPA2-Personal and WPA3-Personal transition mode	93	11
Roaming between WPA3-Personal and WPA3-Personal transition mode	29	4
Roaming between WPA3-Personal compatibility mode and WPA2-Personal	51	4
Roaming between Wi-Fi 7 and Wi-Fi 6 AP when both APs are configured for WPA3-Personal compatibility mode	22	3
Roaming between WPA2-Personal, WPA3-Personal, and WPA3-Personal transition mode	48	18
Roaming between 2.4 GHz/5 GHz (WPA3-Personal transition mode) and 6 GHz (WPA3-Personal)	19	0

Call for contribution and collaboration

Wi-Fi Alliance invites WLPC community to collaborate in shaping the next phase of interoperability evolution — informed by real-world deployment insights.

Your deployment insights and field data are vital to strengthening interoperability assurances and ensuring Wi-Fi delivers consistent, reliable performance for every user and environment.

Thank you!

Gaurav Jain

VP of Technology, Wi-Fi Alliance

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