**IEEE P802.11
Wireless LANs**

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| 11bn PDT MAC Dynamic Bandwidth Expansion (DBE) |
| **Date**: March 19, 2025  |
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 **Abstract**

This document contains Proposed Draft Text (PDT) for the Dynamic Bandwidth Expansion (DBE) feature of the proposed 11bn/UHR amendment to the 802.11 standard.

Text proposed in this version of the PDT is largely based on the scope defined in Motion #334. Other aspects of DBE feature will be addressed in subsequent CR documents.

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revisions based on comments from Mark.
* Rev 2: Changes based on feedback from Laurent.
* Rev 3: Incorporating changes based on comments received from multiple members offline and during the TGbn MAC call.

**Introduction**

Interpretation of a Motion to Adopt.

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGbe Draft. The abstract, revision information, introduction, explanation of the proposed changes and references sections are not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGbn Editor: Editing instructions preceded by “TGbn Editor” are instructions to the TGbn editor to modify existing material in the TGbn draft. As a result of adopting the changes, the TGbn editor will execute the instructions rather than copy them to the TGbn Draft.***

**Relevant passing motions:**

[Motion #334, [1]]

**Move to add to the TGbn SFD the following:**

* 11bn defines a mechanism for dynamic bandwidth expansion (DBE) that enables a UHR AP to modify (expand/reset) its Dynamic UHR operating BSS bandwidth for UHR STAs that support the DBE operation
	+ The dynamic bandwidth change is signaled using management frames and is announced for multiple beacon intervals in advance, and the AP shall stay on the expanded bandwidth until a subsequent dynamic bandwidth change occurs
	+ The primary channel does not change as part of the dynamic BW expansion.
	+ TBD on DBE signaling details

**Text to be adopted begins here.**

* UHR Operation Element

***TGbn editor: Please update UHR MAC Capabilities in 11bn D0.1 to add DBE Enabled field as below***

The format of the UHR Operation element is shown in Figure9-aa1 (UHR Operation element format).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 | B4 B5 | B6 Bx |
|  | DPS Enabled | NPCA Operation Information Present | DBE Mode Active | Reserved | Reserved | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 3 | Y |
| * **UHR Operation Parameters field format**
 |

The DBE Mode Active field indicates whether the DBE mode is active and the AP is operating with a DBE bandwidth that is greater than the BSS bandwidth. The DBE Mode Active field is set to 1 if the DBE mode is active and the AP is operating with a DBE bandwidth, is set to 0 otherwise.

* UHR Capabilities element
* General
* UHR MAC Capabilities Information field

***TGbn editor: Please update UHR MAC Capabilities in 11bn D0.1 to add DBE Support field as below***

The format of the UHR MAC Capabilities Information field is defined in Figure9-aa5 (UHR MAC Capabilities Information field format). [TBD

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B4 | B5 |  B6  | B7 Bx |
|  | DPS Support | DPS Assisting Support | Multi-Link Power Management | NPCA Supported | BSR Enhancement Support | DBE Support | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | x |

﻿Figure 9-aa5 —UHR MAC Capabilities Information field format

|  |
| --- |
| * Subfields of the UHR MAC Capabilities Information field (continued)
 |
| Subfield | Definition | Encoding |
| … | … | … |
| DBE Support | Indicates whether or not DBE operation is supported. | Set to 1 if dot11DBEOptionActivated is true (see 37.x (Dynamic bandwidth expansion (DBE))).Set to 0 otherwise. |

***TGbn editor: Please add the following new subclause 37.x Dynamic Bandwidth Expansion (DBE) to the 802.11bn draft***

37. Ultra-high reliability (UHR) MAC specification

**37.x Dynamic bandwidth expansion (DBE)**

Dynamic bandwidth expansion (DBE) is a mode of operation that allows a UHR AP to operate with an operating bandwidth that is greater than its BSS bandwidth and up to the TBD maximum bandwidth capability supported for DBE by the AP. The expanded operating bandwidth with the DBE mode is referred to as the DBE bandwidth. When an AP is operating with a DBE bandwidth, DBE mode is active on the AP.

DBE enables a UHR AP to advertise and/or modify a DBE bandwidth for the UHR non-AP STAs that support and enable DBE mode. The DBE bandwidth of an AP is always greater than its BSS bandwidth. DBE bandwidth of an AP can be modified to another DBE bandwidth value that is also greater that the BSS bandwidth of the AP. The BSS primary channel does not change as part of AP staring operation with a DBE bandwidth or making changes to its DBE bandwidth. When an AP is operating with DBE bandwidth, non-AP STAs that do not support or have not enabled DBE mode continue to operate within the BSS bandwidth.

﻿A STA that supports DBE operation has dot11DBEOptionActivated equal to true and is called a DBE STA. A DBE STA shall set the DBE Support field of the UHR MAC Capabilities Information field of the UHR Capabilities element to 1.. An AP that supports DBE operation is called a DBE AP and a non-AP STA that supports DBE operation is called a DBE non-AP STA.

A DBE AP shall announce activation of DBE mode with a corresponding DBE bandwidth or a change to DBE bandwidth of currently active DBE mode in Beacon and Probe Response frames using TBD signaling. DBE mode activation or DBE bandwidth change shall be announced for multiple beacon intervals before the corresponding change takes effect. After the DBE mode is activated or DBE bandwidth is changed, the DBE AP shall continue operating with its DBE bandwidth until a subsequent change occurs to its DBE bandwidth.

To terminate an active DBE mode and reset its operation to BSS bandwidth for DBE supporting STAs, an AP shall announce that the DBE bandwidth is being reset to the BSS bandwidth for multiple beacon intervals before the bandwidth reset happens, using the same signaling as used for activation of DBE mode or changes to DBE bandwidth.

NOTE: DBE mode activation, change or reset is announced in advance for multiple beacon intervals and it is not a TxOP level change.

When a DBE AP is operating with an expanded DBE bandwidth, the AP shall set the DBE Mode Active field to 1 in the UHR Operation Parameters field in the UHR Operation element that the AP transmits.

﻿**Annex C**

**C.3 MIB Detail**

***TGbn editor: Please add the following new MIB variable for DBE***

Dot11UHRStationConfigEntry ::=

 SEQUENCE {

dot11CoRTWTOptionImplemented TruthValue,

dot11NPCAOptionImplemented TruthValue,

dot11DUOOptionImplemented TruthValue,

dot11UHRBSROptionImplemented TruthValue,

dot11DBEOptionActivated TruthValue,

}

dot11DBEOptionActivated OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a control variable.

﻿It is written by an external management entity or the SME. Changes take

effect as soon as practical in the implementation.

This attribute, when true, indicates that the station supports DBE operation. If this attribute is false, it indicates that the station does not support DBE operation.”

::= { dot11UHRStationConfigEntry <ana> }

**Text to be adopted ends here.**

**References:**

1. [11-25-0014r13](https://mentor.ieee.org/802.11/dcn/25/11-25-0014-13-00bn-tgbn-motions-list-part-2.pptx): 11-25-0014-13-00bn-tgbn-motions-list-part-2, Alfred Asterjadhi (Qualcomm Inc.)
2. [11-24/0209](https://mentor.ieee.org/802.11/dcn/24/11-24-0209-14-00bn-specification-framework-for-tgbn.docx) “Specification Framework for TGbn”, Ross Jian Yu (Huawei)
3. [11-24-0088r1](https://mentor.ieee.org/802.11/dcn/24/11-24-0088-01-00bn-maximizing-channel-bandwidth-in-dense-ap-deployments.pptx): “Maximizing channel bandwidth in dense AP deployments”,Malcolm Smith *et al* (Cisco Systems)
4. [11-24-0815r1](https://mentor.ieee.org/802.11/dcn/24/11-24-0815-01-00bn-dynamic-bandwidth-selection-signaling-details.pptx): “Dynamic Bandwidth Selection Signaling Details”, Binita Gupta *et al* (Cisco Systems)