DTBS Standard Specification Details

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Assumptions:

• DTBS Service support is optional.
  – But all stations need to provide “DTBS-Coexistence” provisions.

• Not all Phy’s need to specify DTBS capability support.

• A Single State Machine in the MAC can support multiple mechanisms:
  – A passive access priority mechanism
  – An active access priority mechanism
  – No operational access priority mechanism

• A given PHY standard shall specify only one access priority mechanism.
DTBS Support levels:
- The DTBS service is optional.
  - But coexistence mechanisms need to be implemented in every node to assure proper operation in the presence of stations that do implement the service.
- DTBS support levels can be classified in two different levels:
  - The DTBS coexistence mechanisms
    » This is the access priority mechanism. A part of this needs to be included in all stations to assure coexistence with the DTBS service, even when it is not implemented.
  - The DTBS Service interface and priority mapping
    » This is the definition of the LLC interface, and its control by means of the QoS parameter, and the translation of this to the priority levels.
    » In non-DTBS capable stations a fixed priority mapping is to be assigned.

DTBS implementation options:
- Only minimum coexistence mechanism is to be included in all implementations.
Coverage of this proposal:

- This proposal will only cover the "Access Priority" mechanism.
  - Describes a MAC State Machine to support the full Access Priority mechanism.
  - Identifies the minimum coexistence provisions needed.
  - Defines the MIB attributes needed.
- Discusses AP versus Station relative priority characteristics.
- Other DTBS support specifications in particular the LLC interface and Service specifications are documented in doc 94/196, but are not covered by this proposal.

DTBS Generic priority mechanism:

- Extend contention resolution phase with a "Priority resolution Phase".
- If "Medium Free Condition" is met at initial access attempt, then transmission can start immediately without any priority or contention resolution.
  - The MFC can be priority level dependent.
**Generic Priority resolution mechanism:**

- Mechanism can support both active and passive priority resolution method.
- Basic (coexistence) Algorithm:
  - If “Busy Medium” is detected during PDP period, then defer until the next Priority Resolution Window (PRW).

**Single State Machine support both mechanisms:**

- Specified by the PDP and PAS parameters.
  - A set of parameters are needed per priority.
Active Priority example:

- Ack is not shown in example.
- LP traffic does not contend with HP traffic.

Priority_Set examples:

- "Active priority set" example for a 2 priority system:
  - Low priority: PDP = 2 slots, PAS = 0 slots.
  - High priority: PDP = 0 slots, PAS = 2 slots.

- "Passive priority set" example for a 2 priority system:
  - Low priority: PDP = 16 slots, PAS = 0 slots.
  - High priority: PDP = 0 slots, PAS = 0 slots.

- Assume MFC = DIFS + PDP + PAS.
- In a non-DTBS supporting station the default Access Priority setting should be: Low Priority.
MIB variables:

- **aNNumber_of_Priorities:**
  - This indicates the number of different priority levels supported by the Phy. A "1" indicates that no priority mechanism is supported.

- **aPAS_Duration:** Determines the duration of the PAS.

- Per priority the following parameter sets are required:
  - **aPDPx:** Specifies the PDP duration in usec for priority x.
  - **aPASx:** Specifies the PAS duration in usec for priority x.

  Where x indicates the priority level (1 is highest).

- **Other MIB variables:**
  - **aBusyFilt:** Specifies the "Busy medium" condition under which the Backoff algorithm will be exit, to defer until the next PRW.

- **MFC can be derived per priority level.**

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**Basic Transmitter State Machine:**

- **Accm Mode:**
  - MFree=MCFT

- **Select Backoff between 1 and Cw**

- **Wait until DFS after MFree**

- **In all nodes:**
  - Monitor medium during PDP

- **Poll detected?**
  - **Poll:**
    - **Transmit Poll**
    - **Transmit while MFree**
    - **Decrement Backoff while MFree**

- **MBusy=BusyFilt**

- **Timeout**

- **Priority Resolution**

- **Contention Resolution**

- **Done**

Only needed when DTBS supported
Requirements on the Phy:

- A new Class definition is needed to allow a Phy independent PAS signal generation.
  - `Ph-DATA.request(SEND_PAS, param)`
  - The parameters can be the same as for the `START_OF_ACTIVITY` class.

- The Phy can choose to use the same modulation as used in the PLCP header, with the length determined by the `aPAS_Duration` MIB variable.
  - Other modulation suitable for detection by the CCA detection mechanism can be specified.

- The !CCA detection mechanism should be suitable to signal the detection of a PAS signal modulation.
How many priorities needed:

- MAC service maps to:
  - Queueing priority
  - Access Priority

- At least two hierarchical independent priority levels needed to support the main services:
  - Asynchronous service       Low priority
  - Distributed TBS (optional) High priority

- Quality of Service (QoS) should map to priority and Queueing priority.

Additional Priority specification:

- Additional relative priorities possible within a service level using Contention Window size differences.

- Relative Priority difference between AP and station makes sense.
  - Most traffic will be via the AP.
  - So AP would generate close to 50% of frames.
  - Use of separate hierarchical independent levels for AP is not optimum.
    - So in a Multi-priority environment, the AP should not be given a separate level.

- Higher relative Priority settings should only be allowed for an AP.
  - Suggest $\text{AP}_{\text{CWmin}} = \text{STA}_{\text{CWmin}} / 2$
DTBS status

- Priority mechanism presented to the combined MAC/PHY meeting on Tuesday
  - This mechanism was accepted in the MAC group in the September meeting (with a slight modification).
  - The 20B3 draft changes have been distributed.
- This MAC will not only need to support the current Phy's.
  - but also the future Phy's.
  - and possibly higher speed extensions of the current Phy's.
- Therefore this mechanism can serve different Phy's:
  - Phy's that do not support a priority mechanism.
  - Phy's that can support a passive priority mechanism.
  - Phy's that can support an active priority mechanism.

Motion-1:

- Move:
  That not all Phy standards need to support the coexistence mechanism for the optional DTBS service provisions. 7/37/15 fails

  to add: Each phy will specify if it supports this or not as part of its standard Dave/Leon 8/37/17
Motion-2

- Move:
  - That the MAC should implement the Access priority mechanism as described in this proposal as documented in document 94_258x. 7/35/18.