**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | Proposed TBD solutions for D16.1\_5.1.2.1 | |
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| Re: | TG8 draft text to resolve TBD for Channel Scanning | |
| Abstract | This is the work in progress text of the MAC component for IEEE 802.15.8 group for PAC. | |
| Purpose | This document provides the details of draft text to IEEE 802.15.8 | |
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**5.1.2.1 Channel Scanning**

* + - * 1. General description

All PDs shall be capable of performing passive scan, energy detection (ED) and active scans across a specified list of channels. The next higher layer should submit a scan request for a particular channel page containing a list of channels chosen only from the channels specified by *phyChannelsSupported* for that particular channel page.

A PD is instructed to begin a channel scan through the MLME-SCAN.request primitive, as described in 6.1.8.1. Channels are scanned first starting from the common channel and then in order from the lowest channel number to the highest, if applicable. For the duration of the scan, the PD shall suspend transmissions, if applicable, and shall only accept frames received over the PHY data service that are relevant to the scan being performed. For UWB PHYs, each preamble code appropriate to the specified channel is scanned. Upon the conclusion of the scan, the PD may begin transmission if applicable. The results of the scan shall be returned via the MLME-SCAN.confirm primitive as described in 6.1.8.2.

* + - * 1. ED channel scan

An ED scan allows a PD to obtain a measure of the peak energy in each requested channel. This could be used by a prospective PD to select a channel on which to operate prior to starting a new group. During an ED scan, the MAC sublayer shall discard all frames received over the PHY data service.

An ED scan over a specified set of channels is requested using the MLME-SCAN.request primitive with the ScanType parameter set to indicate an ED scan. For each channel, the MLME shall first switch to the channel, by setting *phyCurrentChannel* and *phyCurrentPage* accordingly, and then repeatedly perform an ED measurement for [*aBaseSuperframeDuration* × (2*n* + 1)], where *n* is the value of the ScanDuration parameter in the MLME-SCAN.request primitive. The maximum ED measurement obtained during this period shall be noted before moving on to the next channel in the channel list. A PD shall be able to store at least one channel ED measurement.

The ED scan shall terminate when either the number of channel ED measurements stored equals the implementation-specified maximum or energy has been measured on each of the specified channels.

* + - * 1. Active and passive channel scan

An active or passive channel scan allows a PD to locate any other PD within its radio communications range. A PD in an active scan transmits to extract any other intended PD. A PD in a passive scan detects the intended channels. A message sequence chart for active scan is illustrated in Figure 7 and for passive scan in Figure 8.



Figure 7—Active scan message sequence chart

During an active or a passive scan, the MAC sublayer shall discard all frames received over the PHY data service that are not related to scan. If a scan related frame is received that contains the address of the scanning PD in its list of pending addresses, the scanning PD shall not attempt to extract the pending data.



Figure 8—Passive scan message sequence chart

An active or a passive scan over a specified set of channels is requested using the MLME-SCAN.request primitive with the ScanType parameter set to indicate an active or a passive scan. For each channel, the PD shall first switch to the channel, by setting *phyCurrentChannel* and *phyCurrentPage* accordingly. For an active scan, the PD shall send a scan request command. For UWB PHYs, the scan process shall be repeated for each mandatory preamble code, setting the *phyCurrentCode* appropriately. Upon successful transmission of the scan request command for an active scan or after switching to the channel for a passive scan, the PD shall enable its receiver for at most [*aBaseSuperframeDuration* × (2*n* + 1)], where *n* is the value of the ScanDuration parameter. During this time, the PD shall reject all non-scan-related frames and record the information contained in the received scan frames in a group descriptor structure, as described in subclause 6.1.9, including the channel information and, if required, the preamble code.

If a scan frame is received when *macAutoRequest* is set to TRUE, the list of group descriptor structures shall be stored by the MAC sublayer until the scan is complete; at this time, the list shall be sent to the next higher layer in the GroupDescriptorList parameter of the MLME-SCAN.confirm primitive. A PD shall be able to store at least one group descriptor. A scan frame shall be assumed to be unique if it contains both a group ID and a source address that has not been seen before during the scan of the current channel.

If a scan frame is received when *macAutoRequest* is set to FALSE, each recorded group descriptor is sent to the next higher layer in a separate MLME-Group-NOTIFY.indication primitive as described in subclause 6.1.9. A received scan frame containing one or more octets of payload shall also cause the group descriptor to be sent to the next higher layer via the MLME-Group-NOTIFY.indication primitive. Once the scan with *macAutoRequest* set to FALSE is complete, the MLME-SCAN.confirm shall be issued to the next higher layer with a null GroupDescriptorList.

For UWB PHYs, the scan request is repeated for each preamble code.

If a protected scan frame is received, i.e., the Security Enabled field is set to one, the PD shall attempt to unsecure the scan frame using the unsecuring process described in clause 15.

The security-related elements of the group descriptor, as described in subclause 6.1.9, shall be set to the corresponding parameters returned by the unsecuring process. The SecurityStatus element of the group descriptor shall be set to SUCCESS if the status from the unsecuring process is SUCCESS and set to one of the other status codes indicating an error in the security processing otherwise.

The information from the unsecured frame shall be recorded in the group descriptor even if the status from the unsecuring process indicated an error.

If *macAutoRequest* is set to TRUE, the active scan on a particular channel shall terminate when the number of PDs found equals the implementation-specified limit or the channel has been scanned for the full time. If *macAutoRequest* is set to FALSE, the active scan on a particular channel shall terminate when the channel has been scanned for the full time. If a channel was not scanned for the full time, it shall be considered to be unscanned.

If *macAutoRequest* is set to TRUE, the entire scan procedure shall terminate when the number of group descriptors stored equals the implementation-specified maximum or every channel in the set of available channels has been scanned. If *macAutoRequest* is set to FALSE, the entire scan procedure shall only terminate when every channel in the set of available channels has been scanned.