**IEEE P802.15**

**Wireless Personal Area Networks**

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6.6.12 VLC cell design and mobility support

There may be a need to support link switching due to physical movement or interference. Mobility can be of two types: physical and logical. Physical mobility occurs when the VLC device M1 changes its position due to the movement within the coverage area of infrastructure I1 while logical mobility occurs when the device M1 changes its communication link from a link with infrastructure I2 to one with infrastructure I3 due to interference or deliberate channel switching. This is shown in Figure 134.



Figure 134 = Physical and logical mobility

A co-ordinator DME can separate the optical media into multiple cells for supporting applications such as location based services.

**6.6.12.1 Mobility support using multiple cells**

A single coordinator can support mobility of the device through multiple cells using the PHY switch controlled by the DME as shown in Figure 133. Each optical element in a cell is denoted by *cell\_ID(i,j)* where *j* is the index of the element in the *ith* cell.The size and the position of the cell in the optical media shown in Figure 3 can be variable and can be programmed by the DME. The actual size and position determination for the cell by the coordinator DME is not defined in the standard. If device 1 moves to the next cell, for example, from *cell\_ID(i,j)* to *cell\_ID(i+1,j),* the coordinator can detect the mobility of the device using the uplink signal (i.e. acknowledgment frame).



Figure 133 - **Cell configuration for VLC mobility**

Figure 134 shows the mobility support for a device through multiple cells. When device 1 moves out from *Cell\_ID(i,j)* to *Cell\_ID(i+1,j),* the coordi­nator may not receive the uplink transmission (for example, acknowledgment frame or CVD frame) from *Cell\_ID(i,j).* The coordinator may then search for the device through the adjacent cells such as *Cell\_ID(i+1,j)* and *Cell\_ID(i-1,j)* during the same time slots assigned to device 1 in the superframe*.*  The other devices in *cell\_ID(i,j)* will continue communication in the same cell. The co-ordinator may also expand the cell size in order to provide coverage for mobility of the device. The coordinator can decide on the new cell selection for the device on receiving the uplink transmission from device 1.Thus, if the coordinator can resume communication with the device in *cell\_ID(i+1,j),* the coordinator DME may set the PHY switch to use *cell\_ID(i+1,j)* for device 1 during the time slots allocated for device 1 and then switch back to *cell\_ID(i,j)* to service any existing devices in *cell\_ID(i,j)* in the remaining time slots*.* The searching process can be terminated if the device is not found within the link timeout period, defined in MAC PIB attribute *macLinkTimeOut* in Table 3 and the device can then be considered to be disassociated from the coordinator.



Figure 134— Mobility support for a device through multiple cells

**6.6.12.2 Cell configuration during superframe**

In order to support access for new devices through the entire superframe, the entire optical media shall be configured to a single cell during the beacon and CAP periods. Once devices are discovered and associated, the cell sizes and positions can be determined and the cell structure can be applied to the individual device(s) for communication. This as shown in Figure 135.



Figure 135 Superframe configuration for mobility support