**Pixel and Display Densities**

***Pixel based on display densities (taking care of display size and display resolution).***

**Problem**

There are many displays available for rendering content for different devices. e.g. big screens, projected screens, TVs, computer monitors, tablets IVI displays, phablets, phones, wearables, etc. These displays have different sizes and different resolutions and number of pixels or dots per inch (display pixel density or simply called display density) varies for different displays. Due to this writing the content which will work across different displays seamlessly or with less modification has become difficult and content developer has to consider many different displays e.g. different contents for mobile devices, desktop monitors, etc. Writing content which is relative to display size (width and height) is tedious.

e.g. 100 pixels have different actual dimensions on different displays. This results having different layouts on different displays which may cause overlapping issues.

Consider the following html page rendered on display having resolution 720x1280 and size 5 inches.

|  |
| --- |
| <html><body>  <div style="background-color:red; width: 100px; height:100px;"></div>  </body></html> |

Same “div” on display with resolution 1080x1920 and size 5 inches, would look small. The problem here is CSS pixel is directly mapped to device pixel which gets affected by display size and resolution.

**Proposal**

**This proposal intends to make pixel have similar *(would affect due to pixel height to width aspect ratio)* actual physical size across all displays having same size and different display resolutions. If the display size is changed, then the physical pixel size should get changed proportionately.**

e.g. If 100px (css pixel) on a display of size 5 inches measure 1 inch, then on any other display of size 5 inches it should be ~1 inch, irrespective of the display resolution and similarly for display of size 10 inches, the 100px should measure ~2 inches.

This will help design and develop web pages faster and maintain overall aspect ratio of layout of web page across different displays.

**Pixel <Meta> element name and new property**

|  |
| --- |
| <meta name="pixel" content="baseline-density=640;" ></div> |

|  |  |
| --- | --- |
| pixel | The pixel meta name to specify to compute the pixel dimensions. If not specified 1 css pixel = 1 device pixel. |
| baseline-density | The value of this property defines the number of pixels by considering pixels of the reference display. |

Few definitions assumed are given below.

|  |  |
| --- | --- |
| baseline\_density | Value of baseline-density property *[input]* |
| display\_size | Display size in inches (measured diagonally) *[input : platform]* |
| device\_baseline\_density | Baseline density for the target display on which web page is to be rendered. *[output]* |
| dots\_per\_inch | Number of pixels per inch on the target display. *[input : platform]* |
| pixel\_scale\_factor | Scale factor for pixel for target display *[output]* |

When pixel <meta> name is specified in html page, the rendering engine should compute the pixel value by the following algorithm.

|  |
| --- |
| device\_baseline\_density = baseline\_density / display\_size;  pixel\_scale\_factor = dots\_per\_inch / device\_baseline\_density; |

While computing the pixel values for the target device, those should be multiplied by pixel\_scale\_factor. This makes device width and height different than actual display width and height.

|  |
| --- |
| target\_screen\_width = actual\_screen\_width / pixel\_scale\_factor;  target\_screen\_height = actual\_screen\_height / pixel\_scale\_factor; |

The above html example would have following actual device pixels for the div of 100 pixels.

|  |  |  |
| --- | --- | --- |
| display\_size (inches) | 5 | 5 |
| dots\_per\_inch (device pixels) | 245 *(low end display)* | 545 *(high end display)* |
| pixel\_scale\_factor | 1.9140625 | 4.2578125 |
| **100 css pixels (in device pixels)** | **191.40625** | **425.78125** |
| **Physical dimensions (inches)** | **0.78125** | **0.78125** |