MOVR
Mobile Overview Report
April – June 2019
### South America

**Form Factor**
- Feature: 3%
- Smartphone: 93%
- Tablet: 4%

**Top 5 Smartphones**
- Apple iPhone 7: 4%
- Samsung Galaxy J2 Prime: 3%
- Samsung Galaxy J7 Prime: 3%
- Samsung Galaxy J5 Prime: 3%
- Apple iPhone 6S: 3%

**Top 5 Tablets**
- Apple iPad Air 2: 6%
- Apple iPad 4: 5%
- Apple iPad 2018: 4%
- Samsung Galaxy Tab 3 Lite: 4%
- Apple iPad Air: 4%

**Smartphone OS**
- iOS: 80%
- Android: 20%

**Smartphone Diagonal Size**
- 2-3": 0.1%
- 3-4": 2%
- 4-4.5": 5%
- 4.5-5": 15%
- 5.5-6": 30%
- 6-6.5": 13%
- 6.5": 1%

**Tablet Diagonal Size**
- 7-7.5": 27%
- 7.5-8": 8%
- 8-8.9": 8%
- 9-9.5": 2%
- 9.5-10": 17%
- 10-11": 2%
- 11+": 2%

### Africa

**Form Factor**
- Feature: 21%
- Smartphone: 74%
- Tablet: 6%

**Top 5 Smartphones**
- Samsung Galaxy Grand Prime+: 3%
- Apple iPhone 7: 2%
- Apple iPhone X: 2%
- Apple iPhone 8 Plus: 1%
- Huawei P20 Lite: 1%

**Top 5 Tablets**
- Apple iPad Air 2: 6%
- Apple iPad Air: 5%
- Samsung Galaxy Tab A 10.1: 4%
- Apple iPad 2017: 4%
- Vodafone Tab Mini 7: 4%

**Smartphone OS**
- iOS: 85%
- Android: 14%

**Smartphone Diagonal Size**
- 2-3": 1%
- 3-4": 2%
- 4-4.5": 5%
- 4.5-5": 11%
- 5.5-6": 34%
- 6-6.5": 30%
- 6.5": 17%
- 6.5+: 2%

**Tablet Diagonal Size**
- 7-7.5": 29%
- 7.5-8": 8%
- 8-8.9": 4%
- 9-9.5": 1%
- 9.5-10": 38%
- 10-11": 20%
- 11+": 1%

### Oceania

**Form Factor**
- Feature: 2%
- Smartphone: 81%
- Tablet: 17%

**Top 5 Smartphones**
- Apple iPhone 8 Plus: 8%
- Apple iPhone 7: 7%
- Apple iPhone X: 6%
- Apple iPhone 8: 6%
- Apple iPhone 7 Plus: 5%

**Top 5 Tablets**
- Apple iPad Air 2: 14%
- Apple iPad 2017: 11%
- Apple iPad 2018: 10%
- Samsung Galaxy Tab A: 9%
- Apple iPad Air: 9%

**Smartphone OS**
- iOS: 42%
- Android: 58%

**Smartphone Diagonal Size**
- 2-3": 0%
- 3-4": 0%
- 4-4.5": 3%
- 4.5-5": 24%
- 5-5.5": 13%
- 5.5-6": 38%
- 6-6.5": 18%
- 6.5+: 4%

**Tablet Diagonal Size**
- 7-7.5": 2%
- 7.5-8": 11%
- 8-8.9": 12%
- 9-9.5": 0%
- 9.5-10": 9%
- 10-11": 4%
- 11+": 4%
2019 Q2 to 2019 Q1 Comparisons
Top Smartphones

- The Apple iPhone 7 continues to be the top smartphone used in the world.
- New to the list this quarter is the Samsung Galaxy S9.
- There were no smartphones leaving the list this quarter.
- North America and Oceania continue to be concentrated markets for brands, with the top smartphones accounting for 58.59% and 65.11% respectively.

<table>
<thead>
<tr>
<th>Top Smartphones</th>
<th>Africa</th>
<th>Asia</th>
<th>Europe</th>
<th>N. America</th>
<th>Oceania</th>
<th>S. America</th>
<th>Global</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samsung Galaxy</td>
<td></td>
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</tr>
<tr>
<td>Grand Prime+</td>
<td>3.31%</td>
<td>1.15%</td>
<td>0.11%</td>
<td>0.13%</td>
<td>0.24%</td>
<td>0.05%</td>
<td>0.40%</td>
</tr>
<tr>
<td>Apple iPhone 7</td>
<td>1.91%</td>
<td>3.04%</td>
<td>5.85%</td>
<td>6.17%</td>
<td>6.83%</td>
<td>3.51%</td>
<td>5.41%</td>
</tr>
<tr>
<td>Apple iPhone X</td>
<td>1.62%</td>
<td>4.31%</td>
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<td>6.69%</td>
<td>6.32%</td>
<td>1.69%</td>
<td>4.01%</td>
</tr>
<tr>
<td>Apple iPhone 8 Plus</td>
<td>1.47%</td>
<td>2.91%</td>
<td>2.72%</td>
<td>6.96%</td>
<td>7.63%</td>
<td>1.92%</td>
<td>3.62%</td>
</tr>
<tr>
<td>Huawei P20 Lite</td>
<td>1.42%</td>
<td>1.07%</td>
<td>1.86%</td>
<td>0.30%</td>
<td>0.19%</td>
<td>1.26%</td>
<td>1.31%</td>
</tr>
<tr>
<td>Apple iPhone 7 Plus</td>
<td>1.36%</td>
<td>3.23%</td>
<td>1.96%</td>
<td>5.52%</td>
<td>5.31%</td>
<td>2.07%</td>
<td>2.80%</td>
</tr>
<tr>
<td>Apple iPhone 6S</td>
<td>1.29%</td>
<td>1.92%</td>
<td>3.96%</td>
<td>4.09%</td>
<td>4.90%</td>
<td>2.51%</td>
<td>3.68%</td>
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</tr>
<tr>
<td>Edge</td>
<td>1.19%</td>
<td>0.79%</td>
<td>1.48%</td>
<td>0.83%</td>
<td>1.05%</td>
<td>0.69%</td>
<td>1.09%</td>
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<tr>
<td>Samsung Galaxy S8</td>
<td>1.18%</td>
<td>0.72%</td>
<td>3.00%</td>
<td>2.49%</td>
<td>2.96%</td>
<td>0.90%</td>
<td>2.17%</td>
</tr>
<tr>
<td>Apple iPhone 8</td>
<td>1.09%</td>
<td>2.34%</td>
<td>3.95%</td>
<td>5.10%</td>
<td>5.84%</td>
<td>1.67%</td>
<td>3.91%</td>
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<tr>
<td>Samsung Galaxy J7</td>
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<tr>
<td>Prime</td>
<td>1.01%</td>
<td>3.03%</td>
<td>0.08%</td>
<td>0.35%</td>
<td>0.17%</td>
<td>3.18%</td>
<td>1.14%</td>
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<tr>
<td>Apple iPhone XS</td>
<td>0.58%</td>
<td>2.74%</td>
<td>1.56%</td>
<td>2.51%</td>
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<tr>
<td>Apple iPhone XS Max</td>
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<td>0.61%</td>
<td>1.87%</td>
</tr>
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<td>Apple iPhone XR</td>
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<td>1.80%</td>
<td>1.84%</td>
<td>4.36%</td>
<td>5.00%</td>
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<td>2.36%</td>
</tr>
<tr>
<td>Samsung Galaxy S9</td>
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<td>0.36%</td>
<td>2.19%</td>
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<td>3.14%</td>
<td>0.57%</td>
<td>1.65%</td>
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<tr>
<td>Samsung Galaxy S7</td>
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<td>0.44%</td>
<td>2.14%</td>
<td>1.82%</td>
<td>2.30%</td>
<td>0.55%</td>
<td>1.55%</td>
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<tr>
<td>Apple iPhone 6</td>
<td>1.09%</td>
<td>1.27%</td>
<td>2.09%</td>
<td>2.58%</td>
<td>3.24%</td>
<td>1.83%</td>
<td>2.12%</td>
</tr>
<tr>
<td>Apple iPhone SE</td>
<td>0.29%</td>
<td>0.31%</td>
<td>1.99%</td>
<td>1.39%</td>
<td>1.18%</td>
<td>0.91%</td>
<td>1.60%</td>
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<tr>
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</tr>
<tr>
<td>Prime</td>
<td>0.02%</td>
<td>0.00%</td>
<td>0.01%</td>
<td>0.51%</td>
<td>0.14%</td>
<td>3.41%</td>
<td>0.32%</td>
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<tr>
<td>Samsung Galaxy J5</td>
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</tr>
<tr>
<td>Prime</td>
<td>0.91%</td>
<td>0.38%</td>
<td>0.04%</td>
<td>0.13%</td>
<td>0.28%</td>
<td>2.53%</td>
<td>0.32%</td>
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<tr>
<td>Samsung Galaxy J7</td>
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</tr>
<tr>
<td>(2016)</td>
<td>0.29%</td>
<td>1.00%</td>
<td>0.49%</td>
<td>0.18%</td>
<td>0.04%</td>
<td>1.78%</td>
<td>0.61%</td>
</tr>
<tr>
<td>Samsung Galaxy J5</td>
<td>1.09%</td>
<td>0.75%</td>
<td>0.46%</td>
<td>0.11%</td>
<td>0.12%</td>
<td>1.71%</td>
<td>0.57%</td>
</tr>
</tbody>
</table>

Other        | 75.26%  | 64.31% | 57.54% | 41.41%     | 34.89%  | 65.21%     | 55.60% |

Source: ScientiaMobile. Note: figures reflect percentage point (2019Q1)
Top Smartphone Trends (2019 Q2 vs. 2019 Q1)

- The Apple iPhone XR, Apple iPhone XS, and Apple iPhone XS Max had the most growth this quarter.
- North America saw the largest adoption trend with a 1.68% increase in usage of the Apple iPhone XR.
- Oceania also had a large increase in the Apple iPhone XR with 1.26%. It also saw the largest increase in Apple iPhone XS Max adoption with 1.08%.
- Largest drop in usage is from the Apple iPhone 6, Apple iPhone 7, and Samsung Galaxy S8. Dropping by 1.97%, 1.78%, and 1.54% respectively.

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<th>S. America</th>
<th>Global</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samsung Galaxy Grand Prime+</td>
<td>-0.48%</td>
<td>0.06%</td>
<td>0.00%</td>
<td>-0.01%</td>
<td>0.03%</td>
<td>0.00%</td>
<td>-0.05%</td>
</tr>
<tr>
<td>Apple iPhone 7</td>
<td>-0.07%</td>
<td>-0.37%</td>
<td>-0.23%</td>
<td>-0.39%</td>
<td>-0.76%</td>
<td>0.03%</td>
<td>-0.08%</td>
</tr>
<tr>
<td>Apple iPhone X</td>
<td>0.27%</td>
<td>-0.51%</td>
<td>0.25%</td>
<td>-0.12%</td>
<td>-0.09%</td>
<td>0.05%</td>
<td>0.17%</td>
</tr>
<tr>
<td>Apple iPhone 8 Plus</td>
<td>-0.06%</td>
<td>0.00%</td>
<td>0.30%</td>
<td>-0.21%</td>
<td>-0.67%</td>
<td>0.22%</td>
<td>0.09%</td>
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<tr>
<td>Huawei P20 Lite</td>
<td>0.10%</td>
<td>-0.13%</td>
<td>0.08%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.12%</td>
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<tr>
<td>Apple iPhone 7 Plus</td>
<td>-0.07%</td>
<td>-0.20%</td>
<td>-0.05%</td>
<td>-0.54%</td>
<td>-0.35%</td>
<td>0.03%</td>
<td>-0.14%</td>
</tr>
<tr>
<td>Apple iPhone 6S</td>
<td>0.29%</td>
<td>-0.27%</td>
<td>-0.40%</td>
<td>-0.25%</td>
<td>-0.48%</td>
<td>0.00%</td>
<td>-0.13%</td>
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<tr>
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<td>-0.31%</td>
<td>-0.08%</td>
<td>-0.13%</td>
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<tr>
<td>Samsung Galaxy S8</td>
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<td>0.04%</td>
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<td>-0.59%</td>
<td>-0.55%</td>
<td>0.05%</td>
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<tr>
<td>Apple iPhone 8</td>
<td>-0.04%</td>
<td>0.00%</td>
<td>0.41%</td>
<td>0.13%</td>
<td>-0.43%</td>
<td>0.10%</td>
<td>0.33%</td>
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<tr>
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<td>0.01%</td>
<td>-0.02%</td>
<td>-0.01%</td>
<td>-0.20%</td>
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<tr>
<td>Apple iPhone XS</td>
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<td>0.84%</td>
<td>0.09%</td>
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<tr>
<td>Apple iPhone XS Max</td>
<td>0.38%</td>
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<td>0.81%</td>
<td>1.08%</td>
<td>0.19%</td>
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<tr>
<td>Apple iPhone XR</td>
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<td>0.97%</td>
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<td>-0.06%</td>
<td>0.06%</td>
<td>0.27%</td>
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<tr>
<td>Samsung Galaxy S7</td>
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<td>-0.03%</td>
<td>-0.20%</td>
<td>-0.26%</td>
<td>-0.53%</td>
<td>-0.15%</td>
<td>-0.04%</td>
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<tr>
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<td>-0.38%</td>
<td>-0.13%</td>
<td>-0.77%</td>
<td>-0.55%</td>
<td>-0.29%</td>
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<tr>
<td>Apple iPhone SE</td>
<td>-0.11%</td>
<td>-0.11%</td>
<td>-0.45%</td>
<td>-0.16%</td>
<td>-0.26%</td>
<td>-0.16%</td>
<td>-0.21%</td>
</tr>
<tr>
<td>Samsung Galaxy J2 Prime</td>
<td>0.01%</td>
<td>0.00%</td>
<td>0.00%</td>
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<td>-0.03%</td>
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<td>0.04%</td>
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<td>Samsung Galaxy J5 Prime</td>
<td>-0.05%</td>
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<td>0.00%</td>
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<td>0.02%</td>
<td>-0.07%</td>
<td>-0.01%</td>
</tr>
<tr>
<td>Samsung Galaxy J7 (2016)</td>
<td>-0.04%</td>
<td>-0.18%</td>
<td>-0.03%</td>
<td>-0.04%</td>
<td>0.00%</td>
<td>-0.13%</td>
<td>-0.13%</td>
</tr>
<tr>
<td>Samsung Galaxy J5</td>
<td>-0.16%</td>
<td>-0.25%</td>
<td>-0.09%</td>
<td>-0.04%</td>
<td>0.02%</td>
<td>-0.18%</td>
<td>-0.15%</td>
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<tr>
<td>Others</td>
<td>-0.55%</td>
<td>1.36%</td>
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<td>-0.87%</td>
<td>2.10%</td>
<td>0.67%</td>
<td>-1.00%</td>
</tr>
</tbody>
</table>

Source: ScientiaMobile. Note: figures reflect percentage point change (2019Q1%-2018Q4%).
Top Tablets

- The most significant market share for tablets remains with Apple’s iPad Airs, with the iPad Air 2 leading for the ninth quarter in a row.

- The iPad Air 2 is the most popular tablet across almost all continents with Africa finding the Samsung Galaxy Tab E more popular.

- The Northern American and Oceania tablet markets are much more concentrated by top tablets making up 74.57% and 81.8% of the market respectively.

- Joining the list this quarter is the Samsung Galaxy Tab 4 7.0 and the Samsung Galaxy S3 9.7. Dropping off the list this quarter is the Intel ECS TR10CS1 and the Samsung Galaxy Tab 3V 3G.

<table>
<thead>
<tr>
<th>Top Tablets</th>
<th>Africa</th>
<th>Asia</th>
<th>Europe</th>
<th>N. America</th>
<th>Oceania</th>
<th>S. America</th>
<th>Global</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samsung Galaxy Tab E</td>
<td>6.45%</td>
<td>1.45%</td>
<td>2.51%</td>
<td>1.84%</td>
<td>0.19%</td>
<td>4.08%</td>
<td>2.14%</td>
</tr>
<tr>
<td>Apple iPad Air 2</td>
<td>5.32%</td>
<td>10.34%</td>
<td>10.85%</td>
<td>13.24%</td>
<td>14.07%</td>
<td>6.02%</td>
<td>11.74%</td>
</tr>
<tr>
<td>Samsung Galaxy Tab A 10.1</td>
<td>4.13%</td>
<td>1.12%</td>
<td>7.59%</td>
<td>1.61%</td>
<td>1.64%</td>
<td>1.33%</td>
<td>5.12%</td>
</tr>
<tr>
<td>Apple iPad 2017</td>
<td>3.87%</td>
<td>6.44%</td>
<td>6.78%</td>
<td>9.61%</td>
<td>11.23%</td>
<td>3.74%</td>
<td>8.02%</td>
</tr>
<tr>
<td>Vodafone Tab Mini 7</td>
<td>3.67%</td>
<td>0.02%</td>
<td>0.08%</td>
<td>0.00%</td>
<td>0.01%</td>
<td>0.00%</td>
<td>0.10%</td>
</tr>
<tr>
<td>Apple iPad Air</td>
<td>3.63%</td>
<td>5.81%</td>
<td>8.60%</td>
<td>9.52%</td>
<td>9.26%</td>
<td>4.26%</td>
<td>8.58%</td>
</tr>
<tr>
<td>Apple iPad 4</td>
<td>3.20%</td>
<td>3.25%</td>
<td>4.74%</td>
<td>5.22%</td>
<td>6.86%</td>
<td>5.26%</td>
<td>4.83%</td>
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<tr>
<td>Apple iPad 2018</td>
<td>2.90%</td>
<td>7.53%</td>
<td>6.59%</td>
<td>8.87%</td>
<td>10.30%</td>
<td>4.44%</td>
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<td>1.99%</td>
<td>2.00%</td>
<td>2.46%</td>
<td>2.27%</td>
<td>1.82%</td>
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<tr>
<td>Apple iPad mini 4</td>
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<tr>
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<td>1.49%</td>
<td>3.73%</td>
<td>1.87%</td>
<td>2.72%</td>
<td>2.65%</td>
<td>2.33%</td>
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<td>0.81%</td>
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<tr>
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<td>9.31%</td>
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<tr>
<td>Samsung Galaxy Tab 3 Lite</td>
<td>1.29%</td>
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<td>0.74%</td>
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</tr>
<tr>
<td>Others</td>
<td>48.45%</td>
<td>39.04%</td>
<td>35.40%</td>
<td>25.43%</td>
<td>18.20%</td>
<td>50.58%</td>
<td>32.41%</td>
</tr>
</tbody>
</table>

Source: ScientiaMobile. Note: figures reflect percentage point (2019Q1)
Top Tablet Trends (2019 Q2 vs. 2019 Q1)

- The largest growth (2.88%) comes from Oceania’s increase in usage of the Apple iPad 2018, the 2nd largest growth (2.12%) comes from North America’s usage of the Samsung Galaxy Tab S3 9.7.

- Globally, the Apple iPad 2018 had the most growth in 2019 Q2 of all other tablets (1.42%).

- The largest drop in usage (4.24%) comes from South America’s usage of the Apple iPad Air 2, the 2nd largest drop in usage (2.96%) comes from South America’s usage of the Apple iPad 4.

<table>
<thead>
<tr>
<th>Top Tablets</th>
<th>Africa</th>
<th>Asia</th>
<th>Europe</th>
<th>N. America</th>
<th>Oceania</th>
<th>S. America</th>
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</tr>
<tr>
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<td>Apple iPad Air</td>
<td>-0.43%</td>
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</tr>
<tr>
<td>Apple iPad 2018</td>
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<td>1.29%</td>
<td>1.15%</td>
<td>2.88%</td>
<td>1.48%</td>
<td>1.42%</td>
</tr>
<tr>
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<td>0.48%</td>
<td>-0.10%</td>
<td>-0.02%</td>
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<td>0.03%</td>
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<td>-0.05%</td>
</tr>
<tr>
<td>Apple iPad 2</td>
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<td>-0.03%</td>
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<tr>
<td>Apple iPad Pro 10.5 (2017)</td>
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<tr>
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<td>-0.10%</td>
<td>0.41%</td>
<td>-0.33%</td>
<td>-0.17%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Apple iPad mini</td>
<td>-0.23%</td>
<td>-0.31%</td>
<td>-0.32%</td>
<td>-0.17%</td>
<td>0.10%</td>
<td>0.31%</td>
<td>-0.19%</td>
</tr>
<tr>
<td>Samsung Galaxy Tab A 9.7</td>
<td>-0.04%</td>
<td>-0.38%</td>
<td>-0.17%</td>
<td>-0.05%</td>
<td>-0.26%</td>
<td>-0.20%</td>
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</tr>
<tr>
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<td>0.02%</td>
<td>2.12%</td>
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<td>-0.12%</td>
<td>0.96%</td>
<td>0.14%</td>
<td>-0.02%</td>
</tr>
<tr>
<td>Samsung Galaxy Tab 3 Lite</td>
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<td>-0.01%</td>
<td>-0.24%</td>
<td>-0.14%</td>
<td>0.10%</td>
<td>-0.12%</td>
</tr>
<tr>
<td>Others</td>
<td>-1.64%</td>
<td>2.76%</td>
<td>0.58%</td>
<td>-0.93%</td>
<td>-2.16%</td>
<td>2.23%</td>
<td>-0.09%</td>
</tr>
</tbody>
</table>

Source: ScientiaMobile. Note: figures reflect percentage point change (2019Q1%-2018Q4%)
Global Smartphone OS Versions

- Among Android, Android 8.0 (13.49%) is the most popular version, but it has decreased by 5.31% from last quarter. Android 9 is the next most popular Android version at 12.66%. Android legacy versions are still a large portion of the market, holding 18.48%.

- Among iOS versions, 12.2 is the most popular OS version globally across both Android and iOS with 16.72% share. iOS 12.3 is the 2nd most popular iOS with 7.57% share.
iOS Smartphone Operating System Trends

- **iOS 12.3** is the most popular iOS version, ending June with 71.78%.
- Over 90% of users are on 11.x or above, indicating the success of Apple iOS upgrade process.
- All of the 10.x releases total only 6.44%.

- By the end of Q2, the new 12.3 has surpassed 12.2.
- Most 11.x and 10.x iOS are using the most recent version of the major release (i.e. 11.4 and 10.3).

**Point of Clarification:**
Unlike the Global Smartphone OS Versions, this data is measured at the end of 2019 Q1, and not averaged across the quarter.

**Legacy Definition:** iOS before 11.0, Android before 4.4
Android Smartphone Operating System Trends

- Android 9.0 is the top OS version at the end of 2019 Q2, beating out Android 8.1 by 15.93%.
- Android Legacy accounts for the 2nd most popular OS version.
- Versions 8.x account for 27.11% of Android OS.
- Releases 7.x accounts for 11.88% of Android traffic.

- Releases 6.x and prior account for 7.78% excluding legacy.
- Android has always struggled to upgrade users, we do have some hope with the majority of users shifting to Android 9.0 from the previously popular Android 8.0 version.

Point of Clarification:
Unlike the Global Smartphone OS Versions, this data is measured at the end of 2019 Q1, and not averaged across the quarter.
GPU Usage in Smartphones
GPU Family Usage on Smartphones - Global

- Graphical Processor Units (GPU) are an essential part of most modern smartphones. They improve the performance in the rendering of video, games, and other graphics.
- In 2015, 8.25% of smartphones did not have an embedded GPU. By 2019, almost every smartphone (over 99%) had a GPU.

In 2019 Q2, the ARM Mali is the most common GPU family, with 39.11% of all smartphones.

Apple is the second most popular with 25.75%. Since 2015, Apple started to manufacture its own GPU for most of its smartphones.

Qualcomm Adreno line at 23.49% is the third most used GPU family.

GPU Usage by GPU Manufacturer Family

<table>
<thead>
<tr>
<th>GPU Manufacturer Family</th>
<th>2015 Usage</th>
<th>2019 Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No GPU</td>
<td>0.40%</td>
<td>8.25%</td>
</tr>
<tr>
<td>Adreno</td>
<td>35.13%</td>
<td>23.49%</td>
</tr>
<tr>
<td>Apple</td>
<td>25.75%</td>
<td></td>
</tr>
<tr>
<td>Mali</td>
<td>14.07%</td>
<td>39.11%</td>
</tr>
<tr>
<td>PowerVR</td>
<td>39.55%</td>
<td></td>
</tr>
<tr>
<td>Tegra</td>
<td>0.18%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Videocore</td>
<td>2.40%</td>
<td>0.09%</td>
</tr>
<tr>
<td>Vivante</td>
<td>0.43%</td>
<td>0.06%</td>
</tr>
</tbody>
</table>
Top GPU Models

- The GPU landscape changed dramatically from 2015 Q2 to 2019 Q2.
- In 2015, PowerVR models accounted for 5 of the top 10 GPU models. The Qualcomm Adreno 305 was the most used with 12.41%.
- In 2019 Q2, Apple’s A11 GPU was the most popular at 11.52%, followed by Apple’s A10 at 8.12%
- PowerVR GT7600 is the third most popular at 6.32%. It is the only PowerVR GPU on the top 10 list.
- The remainder of the top 10 is dominated by ARM Mali and Qualcomm Adreno GPUs.

Top GPU Models by Usage in 2015 Q2

- Qualcomm Adreno 305: 12.41%
- Qualcomm Adreno 330: 11.93%
- PowerVR SGX543 MP3: 10.17%
- PowerVR GX6450: 8.60%
- PowerVR G6430: 8.29%
- PowerVR SGX544 MP3: 5.48%
- ARM Mali 400 MP4: 4.92%
- PowerVR SGX543 MP2: 3.40%
- ARM Mali 400 MP2: 3.30%
- Qualcomm Adreno 302: 2.69%

Top GPU Models by Usage in 2019 Q2

- Apple A11 GPU: 11.52%
- Apple A10 GPU: 8.12%
- PowerVR GT7600: 6.32%
- Apple A12 GPU: 6.11%
- ARM Mali T830 MP1: 5.32%
- ARM Mali T830 MP2: 4.44%
- ARM Mali T720 MP2: 3.69%
- Qualcomm Adreno 306: 3.69%
- Qualcomm Adreno 506: 3.15%
- Qualcomm Adreno 308: 2.93%
Fortnite GPU Requirements

- Fortnite recommends a minimum level of OS version, RAM and GPU.
- 84.27% of iPhones usage today comes from devices that meet that Fortnite’s requirements.
- In contrast, only 19.34% of Android devices meet Fortnite requirements.

**Smartphones Meeting Fortnite Recommended Requirements, by OS - Global**

- **OS**: 64 bit Android 8.0 or higher
- **RAM**: 3GB or higher
- **GPU**: Adreno 530 or higher, Mali-G71 MP20, Mali-G72 MP12 or higher

- **OS**: iOS 12.0 or above
- **Model**: iPhone SE, 6S, 6S Plus, 7, 7Plus, 8, 8 Plus, X, XS, XS Max, XR

- **OS**: iOS 12.0 or above
- **Model**: iPhone SE, 6S, 6S Plus, 7, 7Plus, 8, 8 Plus, X, XS, XS Max, XR

- 8 of top 10 Android models that meet Fortnite’s requirements are Samsung Galaxy models.
- The most used Android device that meets Fortnite requirements is the Samsung Galaxy S8 with 2.1% of global smartphone usage.

**Top Android Models That Meet Fortnite Requirements**

- Samsung Galaxy S8: 2.11%
- Samsung Galaxy S7: 1.41%
- Samsung Galaxy S9: 1.08%
- Samsung Galaxy S7 Edge: 0.98%
- Samsung Galaxy S8+: 0.92%
- Samsung Galaxy S9+: 0.74%
- Samsung Galaxy Note8: 0.72%
- Huawei P20 Pro: 0.50%
- Huawei P20: 0.39%
- Samsung Galaxy S10+: 0.38%

% of Smartphone Usage - Global
Smartphones Meeting Fortnite Requirements

- Looking across various continents, Africa has the lowest percent of iPhones meeting requirements, with 77.36%. However, most continents are above 80%, which is a large share of the iOS market.

- Oceania has 43.04% of its Android usage meeting Fortnite requirements. However, only 5.14% of S. American smartphone usage meets requirements.
MSRP of Smartphones Meeting Fortnite Requirements

- Fortnite’s combination of GPU, RAM and OS sets a high price for smartphones meeting their requirements.
- More than 40% of devices meeting the requirements are have an MSRP in the $800-900 range. 85% of devices that meet the requirements are priced higher than $800.

- Fortnite requirements ensure a better gaming experience, but exclude a large portion of the market who have phones under the $800 price level.

Price Distribution of Fortnite-Compatible Smartphones
scientiamobile

Device Fragmentation Trends, 2015-2019

Try our new MOVR Visualization Tool
How Many Device Model Profiles Are There in 2019?

- ScientiaMobile’s WURFL is the most accurate and complete device detection solution on the market. As of the writing of this report, the WURFL device detection solution tracks more than 63,000 device profiles.
- Device fragmentation, as measured by the count of device profiles, has grown at almost 20% annually.
- Not all of these device profiles are in use today; many are from older feature phones or smartphones from the previous decade. Nevertheless, a good portion of these devices are still in use around the world.
How Many Smartphones Are Used In Different Continents?

- In 2019, Asia saw the highest number of different smartphone profiles, with a count of 11,675 during 2019 Q1. Most of this fragmentation is driven by the abundance of Android smartphone models produced in China.

- Comparing 2015 Q1 to 2019 Q1, smartphone fragmentation has grown over 100% in Asia. While the other continents have fewer device profiles, Europe, North America, South America, and Africa have all experienced similar doubling of device profiles in use.

The number of smartphone models in use has doubled on most continents
How Many Tablets Are Used In Different Continents?

- Tablets show different levels of fragmentation than smartphones. Europe has the highest number of different tablet models in use, with 3,176 during 2019 Q1.
- Apple’s iPads have dominated much of the tablet industry for the last four years. For this reason, tablet fragmentation is not as severe as in the smartphone sector. Likewise, the count of tablet models in use has grown only 18% over the last four years.

Tablet Model Fragmentation By Continent, 2015 Q1 vs 2019 Q1

*The number of tablet models has grown 10% on most continents*
How Much Usage Is Driven By The Most Popular Phones?

- Fragmentation is a real issue, but do the top 10 phones drive the most usage? If this is the case, then it simplifies development. Looking at 2019 Q1 global data, the top 21 smartphones account for only 42% of usage.

- Drilling down to each continent, Africa has the most unconsolidated usage, with the top 21 devices accounting for only 23%. In Oceania, where iPhones account for the majority of usage, the top 21 devices account for 64% of usage.

Usage Driven by Top 21 Smartphones

- Asia: 37%
- Europe: 40%
- N. America: 56%
- S. America: 35%
- Africa: 23%
- Oceania: 64%
How Many Devices Are Needed To Reach 95% Of Usage?

- While the usage generated by the top devices is significant, it does not necessarily simplify the fragmentation situation. Most developers want to make sure their efforts ensure a good experience on 95% of devices.

- In a continent like Oceania, this means taking into account only 158 smartphones. However, in Africa where fragmentation is high, developers would need to consider 637 smartphones.
Long Tail of Smartphone

- Commonly referred to as “the long tail”, smartphones on most continents have a significant long tail. The below chart shows the 95% threshold intersecting the cumulative usage curves of each continent.
- We have truncated the long tail here which for continents like Asia extend to more than 11,000 devices.
Wi-Fi Class Support
Wi-Fi Class Support

- As Wi-Fi technology has advanced, Smartphones have shifted to the newer standards.
- Today in 2019 Q2, 802.11ac is the most commonly supported Wi-Fi class with 62.71%.
- In 2015 Q2, 802.11n remained the most frequently supported version with 45.13%. In 2015, 33.37% of the usage came from 802.11ac compatible smartphones, and 20.89% came from slower 802.11g smartphones.
- To date, few manufacturers has shipped devices supporting the newest Wi-Fi class 802.11ax.

Wi-Fi Support by Smartphone Usage
Wi-Fi by Operating System

- Android devices are lagging behind in their support of 802.11ac, with only 43.70%. And support has grown only 4% points since 2015.
- In fact, 802.11n is still the most widely used Wi-Fi class on Android smartphones, with 54.32%.

• In contrast, Apple iPhones used in 2019Q2 are almost all on 802.11ac Wi-Fi.
• This is a marked change from 2015, when 76.08% of iOS smartphone usage was on 802.11n.
How To Improve Lighthouse or Webpagetest Image Scores
Recommendations for Improving Image Loading Speed From Lighthouse

Examples of Image Optimization Recommendations from Lighthouse

△ Properly size images
• Images’ pixel dimensions are frequently much larger than required for the size and resolution of the requesting device.

△ Serve images in next-gen formats
• Convert and serve images in more efficient image file formats like WebP or JPEG 2000.

Efficiently encode images
• Image files typically are rendered in higher than necessary quality that generates a much larger file size, but provides no perceptible visual difference on most devices.

Opportunity is accelerate web page loading by 3.09 seconds by optimizing images in this example.
Four Potential Image Optimization Strategies

1. Image Editing Tool
Straight out of PhotoShop. This is the baseline of what you might receive from your design department.

2. Build-Time Optimization
Use a task manager when building website to generate multiple static image variants. No device detection, format conversion, or CDN-assisted image delivery.

3. Run-Time Optimization
Server does basic analysis of the request header to enable run-time format conversion, support for client hints, or static resizing. No true device detection occurs. Can be offered by a CDN, or can be coupled with a third party CDN.

4. Device Aware Optimization
Edge-server of a CDN detects the specific device model and all relevant capabilities of its screen, browser, OS and other properties. Platform generates either a new image tailored to the exact specification of that device, or it delivers a pre-existing version from its cache.
Difference Between Run-Time and Device Aware Image Optimization

- Device-Aware Optimization is a further refinement of Run-Time Optimization.
- With more detail about the device, a more optimized version of the image can be served.
- Optimization reduces the payload from 60% of the original to 34.8%.

**Image Optimization Comparison Methodology**

**Run-Time Optimization**

- **Regular Expression on User Agent**
  - \( \text{if} \ (g \_ \text{length}()) \rightarrow \{ \)
  - \( \text{return} \ (g \_ \text{length}()) \rightarrow 1 \)
  - \( \text{&&} \ (g \_ \text{charAt}(0) \rightarrow \text{g} \_ \text{charAt}(0) || \text{p} \_ \text{charAt}(0) \rightarrow \_\_\_\_\_\_\) \)

- **Client Hints (if available)**

**Device-Aware Optimization**

- **WURFL Device Detection**
  - **WURFL**

- **Client Hints (if available)**

**Image Optimizer Inputs**

**Run-Time Optimization**

- Browser WebP Support
- Browser JPEG 2000 Support
- Screen Size
- Pixel Density

**Image Payload Results**

- 60%

**Device-Aware Optimization**

- Device Model
- Operating System
- Browser
- Screen Size, PPI, DPR
- Image Support
- Video Support

**Image Payload Results**

- 34.8%
Results from Image Optimization Strategies

- Comparing the baseline of an image from an image editing tool to various optimization strategies, you see progressive improvement in payload size.
- Build-Time Optimization reduces images to 80% of their original size.
- Run-Time Optimization reduces images to 60% or the original payload size.
- The best performance comes with greater knowledge of the device. Device-Aware Optimization delivers a dramatically smaller payload, 34.8% of the original.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Index of payload size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image Editing Tool</td>
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<tr>
<td>Build Time Optimization</td>
<td>80%</td>
</tr>
<tr>
<td>Run Time Optimization</td>
<td>60%</td>
</tr>
<tr>
<td>Device Aware Optimization</td>
<td>34.5%</td>
</tr>
</tbody>
</table>

*Image Engine*
Device-Aware Edge Servers + Image Optimization + Content Delivery Network

Start a free trial at ImageEngine.io
Spotlight: Sweden
Form Factor

- Sweden has a high percentage of usage coming from smartphones with 49.10%. Sweden uses smartphones more than the USA by more than 10%.
- Tablet usage is comparable, with Swedish tablet usage at 6.57%, while USA is at 5.73%.
- Feature phone is below 1% in both countries.
Top Smartphones

- The most used smartphone in Sweden during 2019 Q2 was the Apple iPhone 7 at 10.82%.
- The most used smartphone in the USA during 2019 Q2 was the Apple iPhone 8 Plus at 8.03%.
- In fact, the top 5 smartphones in Sweden are all Apple iPhones.

- Samsung is the only other manufacturer appearing in the top smartphone list.
- The Samsung Galaxy S8 is the most popular Android smartphone, with 4.32% of Swedish usage.

<table>
<thead>
<tr>
<th>Top Smartphones - Sweden vs. USA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Apple iPhone 7</strong></td>
</tr>
<tr>
<td>6.23%</td>
</tr>
</tbody>
</table>

% of all smartphone usage
Top Smartphone Manufacturers

- Apple is the leading manufacturer in both countries with 55.61% of the Swedish smartphone usage and 58.74% of the USA smartphone usage.
- Samsung is second in both countries, with 26.64% in Sweden and 24.68% in the USA.

Together, Apple and Samsung control over 80% of the market in both countries.

- Huawei (8.42%), Sony (3.15%), and Xiaomi (1.29%), and OnePlus (1.13%) are the next largest manufacturers, but the remaining smaller manufacturers do not break the 1% mark.

% of all smartphone usage
Top Tablets

- The Apple iPad Air 2 is the most popular tablet in Sweden with 20.51% of tablet usage. While the Apple iPad Air 2 is also the most popular tablet in the USA, it only has 13.33% of usage.
- Apple holds 10 of the top 13 of the top tablets in Sweden.
- Samsung has the most the sixth most popular tablet with the Samsung Galaxy Tab A 10.1 generating 4.52% of usage.

Top Tablets - Sweden vs. USA
Top Tablet Manufacturers

- Apple dominates the Swedish and USA markets with 78.96% and 73.91% respectively.
- Samsung is the second most popular tablet manufacturer in both Sweden and the U.S.A. with 12.52% and 14.10% share respectively.
- Lenovo is the third most popular tablet manufacturer in Sweden with 3.84%.

![Top Tablet Manufacturers - Sweden vs. USA](image-url)

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Sweden</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>78.96%</td>
<td>73.91%</td>
</tr>
<tr>
<td>Samsung</td>
<td>12.52%</td>
<td>14.10%</td>
</tr>
<tr>
<td>Lenovo</td>
<td>3.84%</td>
<td>0.54%</td>
</tr>
<tr>
<td>Huawei</td>
<td>2.11%</td>
<td>0.17%</td>
</tr>
<tr>
<td>Asus</td>
<td>0.56%</td>
<td>0.72%</td>
</tr>
<tr>
<td>Sony</td>
<td>0.44%</td>
<td>0.03%</td>
</tr>
<tr>
<td>Acer</td>
<td>0.16%</td>
<td>0.09%</td>
</tr>
<tr>
<td>Amazon</td>
<td>0.10%</td>
<td>6.58%</td>
</tr>
<tr>
<td>Nvidia</td>
<td>0.06%</td>
<td>0.01%</td>
</tr>
<tr>
<td>LG</td>
<td>0.05%</td>
<td>0.64%</td>
</tr>
<tr>
<td>RCA</td>
<td>0.00%</td>
<td>0.54%</td>
</tr>
<tr>
<td>ZTE</td>
<td>0.00%</td>
<td>0.26%</td>
</tr>
<tr>
<td>Ellipsis</td>
<td>0.00%</td>
<td>0.18%</td>
</tr>
</tbody>
</table>

% of all tablet usage
Smartphone OS Version

- iOS is the most popular operating system in both countries, with 55.61% in Sweden and 58.74% in the USA.
- The most popular version of iOS in Sweden and the USA is version 12.2, with 48.41% and 44.37% respectively.
- Android 9 is the most popular Android version in Sweden with 31.88%.

Operating Systems - Sweden vs. USA

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Sweden</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Android</td>
<td>45.14%</td>
<td>41.21%</td>
</tr>
<tr>
<td>iOS</td>
<td>55.61%</td>
<td>58.74%</td>
</tr>
<tr>
<td>others</td>
<td>0.06%</td>
<td>0.04%</td>
</tr>
</tbody>
</table>

% of all smartphone usage

iOS

<table>
<thead>
<tr>
<th>Version</th>
<th>Sweden</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.4</td>
<td>1.03%</td>
<td>4.13%</td>
</tr>
<tr>
<td>12.3</td>
<td>2.34%</td>
<td>21.34%</td>
</tr>
<tr>
<td>12.2</td>
<td>18.63%</td>
<td>44.37%</td>
</tr>
<tr>
<td>12.1</td>
<td>19.97%</td>
<td>48.41%</td>
</tr>
<tr>
<td>12</td>
<td>4.15%</td>
<td>7.15%</td>
</tr>
<tr>
<td>11.4</td>
<td>2.77%</td>
<td>2.77%</td>
</tr>
<tr>
<td>11.3</td>
<td>0.70%</td>
<td>0.50%</td>
</tr>
<tr>
<td>11.2</td>
<td>1.34%</td>
<td>1.34%</td>
</tr>
<tr>
<td>11.1</td>
<td>0.21%</td>
<td>0.21%</td>
</tr>
<tr>
<td>11</td>
<td>4.43%</td>
<td>4.43%</td>
</tr>
<tr>
<td>legacy</td>
<td>3.29%</td>
<td>4.14%</td>
</tr>
</tbody>
</table>

% of all iOS smartphone usage

Android

<table>
<thead>
<tr>
<th>Version</th>
<th>Sweden</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>31.88%</td>
<td>41.91%</td>
</tr>
<tr>
<td>8.1</td>
<td>4.85%</td>
<td>9.15%</td>
</tr>
<tr>
<td>8</td>
<td>20.50%</td>
<td>24.00%</td>
</tr>
<tr>
<td>7.1</td>
<td>4.34%</td>
<td>2.40%</td>
</tr>
<tr>
<td>7</td>
<td>7.25%</td>
<td>8.48%</td>
</tr>
<tr>
<td>6</td>
<td>5.14%</td>
<td>4.15%</td>
</tr>
<tr>
<td>legacy</td>
<td>14.21%</td>
<td>21.74%</td>
</tr>
</tbody>
</table>
Price and Age of Smartphones

- Both Sweden and the USA prefer the features found in higher priced phones. 75.43% of smartphones are priced at more than $700, compared to 78.26% in the USA.
- The median price of a smartphone in Sweden is $849, compared to $899 in the USA.

- Sweden does not have as many early adopters of new devices. Only 11.38% of smartphone usage comes from devices less than 1 year old, compared to 19.95% in the USA.
- Likewise, Swedes do not replace their device as quickly as the USA. The median age of a smartphone in Sweden is 26 months, compared to only 21 months in the USA.
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- **Delivery Frequency**: select how often the MOVR data delivered, including annual, quarterly, monthly, weekly, or daily
- **Contact**: sales@scientiamobile.com

About this Report & Resources
Report Specifications

- **Purpose of Report**
  - ScientiaMobile publishes MOVR to provide the mobile Web community with timely information on mobile Web device usage.
  - Our goal is to stimulate interest in mobile device trends, device capabilities, and tools for analyzing and managing device fragmentation.

- **Sources of Data and Filtering**
  - The information in this report is based on a representative sample of a larger data set. The sample size is over 113.0 billion requests from April 2014 to end of June 2019.
  - MOVR focuses on mobile devices, consisting of smartphones, tablets, and feature phones.
  - While the data set includes desktops, laptops, smart TVs, game consoles, apps, and robots, we have excluded them, unless otherwise noted.
  - We have used an Equivalent Weighted Sites (EWS) methodology that indexes the traffic at each site and assigns an equal weight to each site.
  - Samples sizes for Africa and Oceania are small enough that we have a low level of confidence that these figures are representative. However, the source data from these continents continues to grow. Over time, we will improve the quality of these figures. In the meantime, we feel that more information is better than less for people looking for insights in these continents.
  - To download the data files supporting MOVR, or subscribe to future publications of MOVR, please visit us at [www.scientiamobile.com/movr](http://www.scientiamobile.com/movr)

**Definitions**

- **What is a “hit”?** Each time a user visits a Web page and a user agent (UA) is generated and tested by WURFL (through a number of mechanisms), a “hit” is recorded in the ScientiaMobile dataset. All data reported in MOVR reflects hits, not the count of physical devices generating the hit.

- **What is a smartphone?** A smartphone must meet several criteria: it must be a wireless device, have a touch screen with horizontal resolution greater than or equal to 480px, and not be considered a tablet.

- **What is a tablet?** Criteria for a tablet include: a wireless device, be marketed as a tablet, and running a mobile or tablet OS. One exception is that a full version of Windows running on a tablet is considered to be a laptop.
• **What is a feature phone?** It is a wireless device that falls into one of the three categories: classic feature phones, modern feature phones, and old smartphones.

  - **Classic feature phone:** Typically a bar, slide, or clamshell form factor with limited possibilities to install apps and a proprietary OS. Other criteria include a physical keyboard and a low price range. Examples are Nokia Series 30 and 40 or Motorola Razr devices.

  - **Modern feature phone:** These phones also have a low price range. They are “smartphone-like”, but targeted at the classic feature phone market. They may have a smartphone OS. They borrow features from classic feature phones, such as size or screen size. Examples are Nokia Asha series or Samsung Galaxy Pocket.

  - **Old smartphones:** These smartphones are older. Classic Blackberry devices and Symbian-based devices fall into this category. More recent devices with a touch screen, but with older hardware or older versions of Android, iOS or Windows Phone also fall into this category.

• **What is MNO Traffic?** Traffic originating from Mobile Network Operators (MNO). It is defined, in our research method, as the connection type provided by the browser navigator.connection API.

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**About WURFL**

• ScientiaMobile uses its WURFL products to collect and analyze the device intelligence contained in the MOVR report. WURFL is a Device Description Repository (DDR) that integrates an API and XML to provide an always-updated source for detecting devices and their capabilities. For more than 10 years, WURFL has been the industry standard for device detection. Today, ScientiaMobile offers a number of WURFL products to match a range of needs, from small developers to large enterprises.

  • WURFL OnSite and WURFL InFuze provide businesses with high performance server-side device detection solutions.

  • WURFL.js provides front-end developers with access to device detection through JavaScript snippets.

  • WURFL InSight provides business intelligence analysts with a table-based device detection tool that will integrate easily with data analysis tools.

  • ImageEngine combines mobile device detection with image resizing, image file optimization, and Content Delivery Network (CDN)-type delivery. It provides significantly faster downloads, especially on mobile devices.
ScientiaMobile provides the industry’s most accurate and flexible device detection solution, helping customers deliver great web experiences and manage the increasingly fragmented mobile device ecosystem. ScientiaMobile sells WURFL, a constantly-updated repository that catalogues thousands of devices and their capabilities and provides access to them via range of API languages. The WURFL framework enables many organizations, including Fortune 500 companies, to effectively design and analyze web experiences for an ever-growing range of smartphones, tablets, smart TVs, and game consoles.

For more information about ScientiaMobile and its commercial products, please visit us at: www.scientiamobile.com

WURFL.io offers a number of free tools for device detection and image tailoring.

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