



Looking Ahead at Flash Memory

Sorting Through the Consumer Storage Alternatives

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Consumer Usage Trends

- Usage trends driving platform designs
- Platform designs providing richer experiences
- Richer experiences leading to application and market specific requirements
- Varying requirements creating an explosion of divergent storage architecture solutions

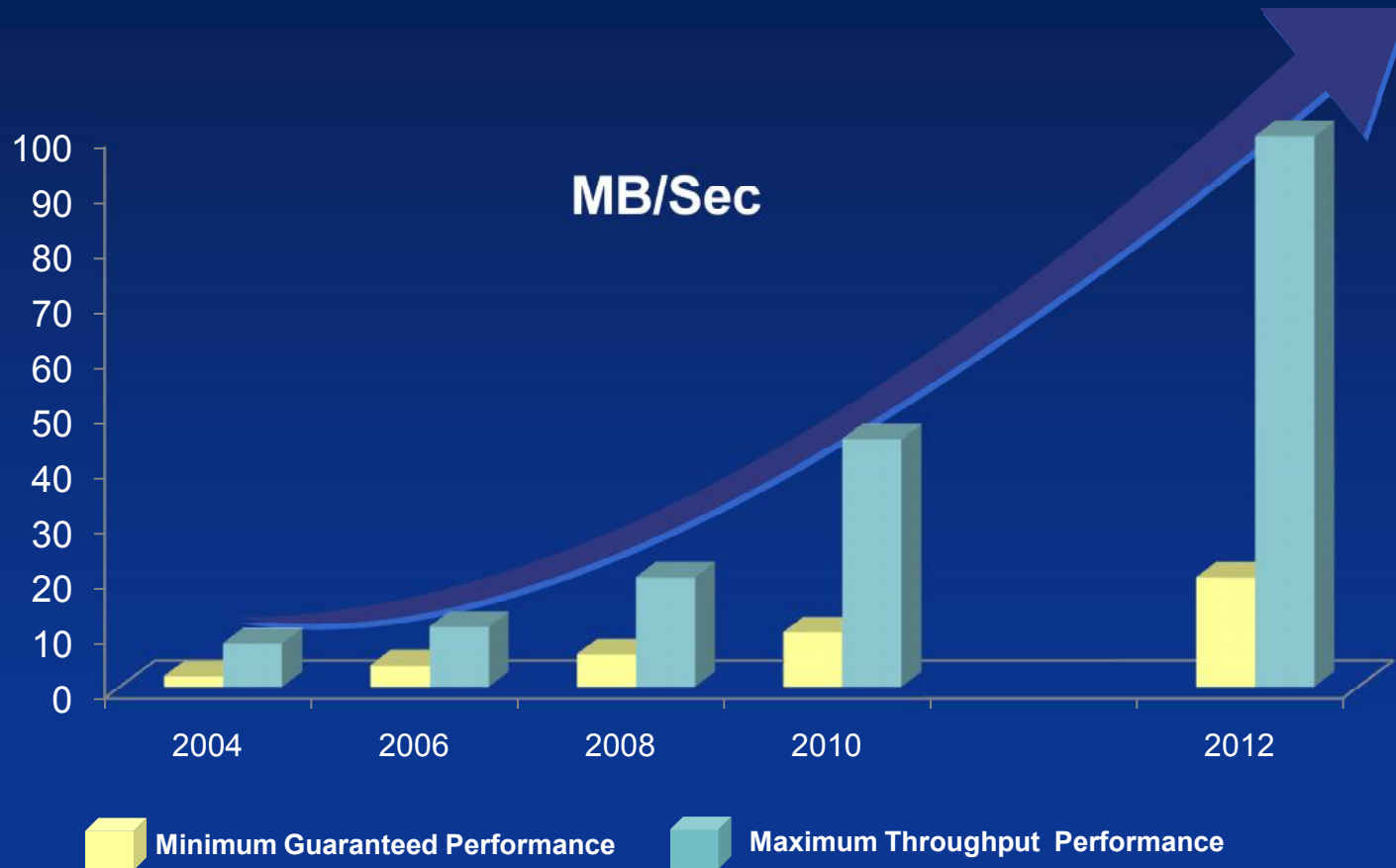
Imaging Usage Trends



Image Capture	Video Capture	User Generated Content Sharing	Pro & 3D Video Recording
<ul style="list-style-type: none">• Mega-Pixels• Sensor size• Shots/second	<ul style="list-style-type: none">• Speed Classes• Hi Def• Full HD	<ul style="list-style-type: none">• Social networking• Video upload• Multi-media sharing	<ul style="list-style-type: none">• Multi-1080p video streams• Faster file transfers• Improved work flow

- Increasing storage capacity
- Faster throughput video transfers
- Going from single-video stream recording to multi-stream 3D recording
- Higher guaranteed minimum throughput required

Imaging Card Performance Trends



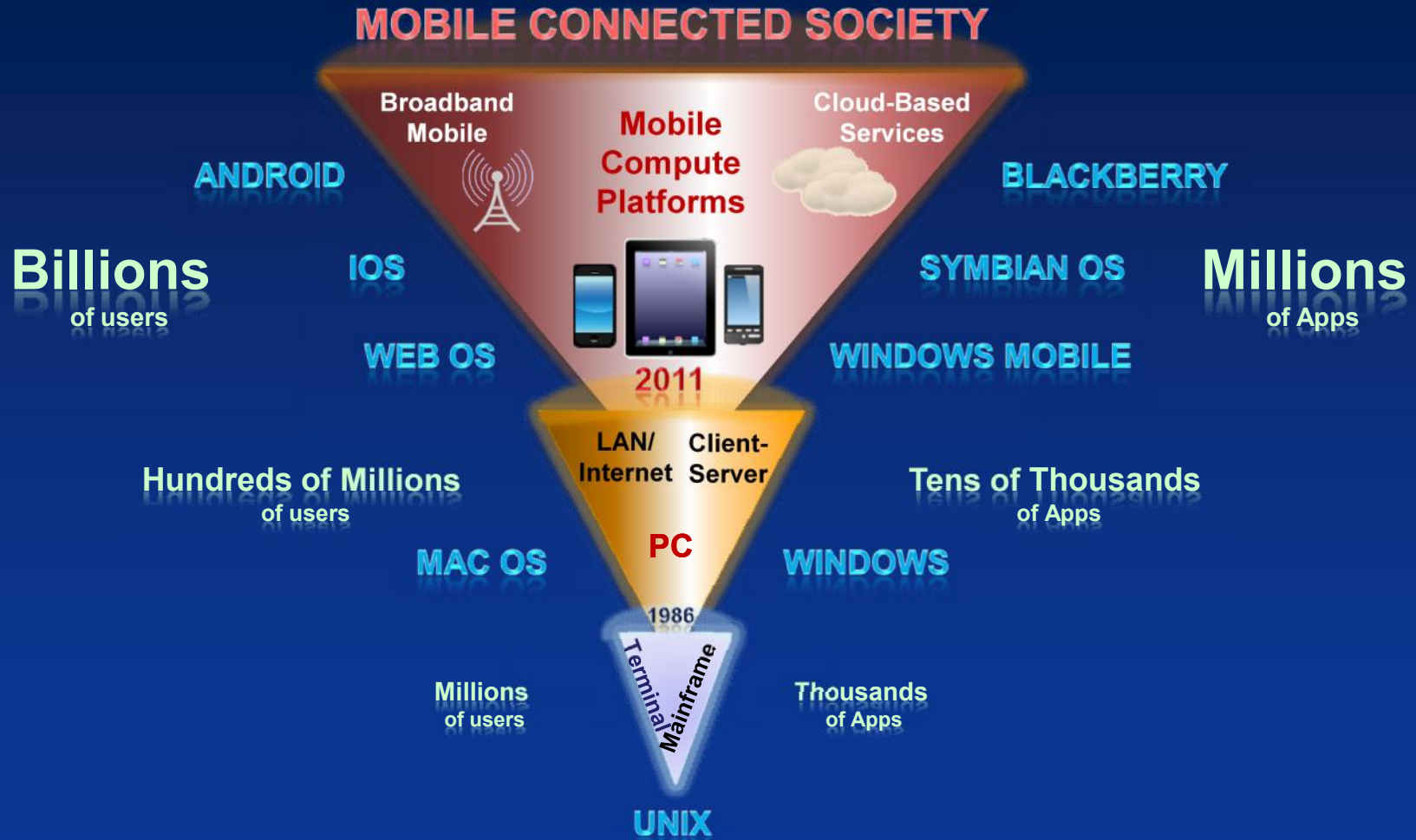


Performance Trends

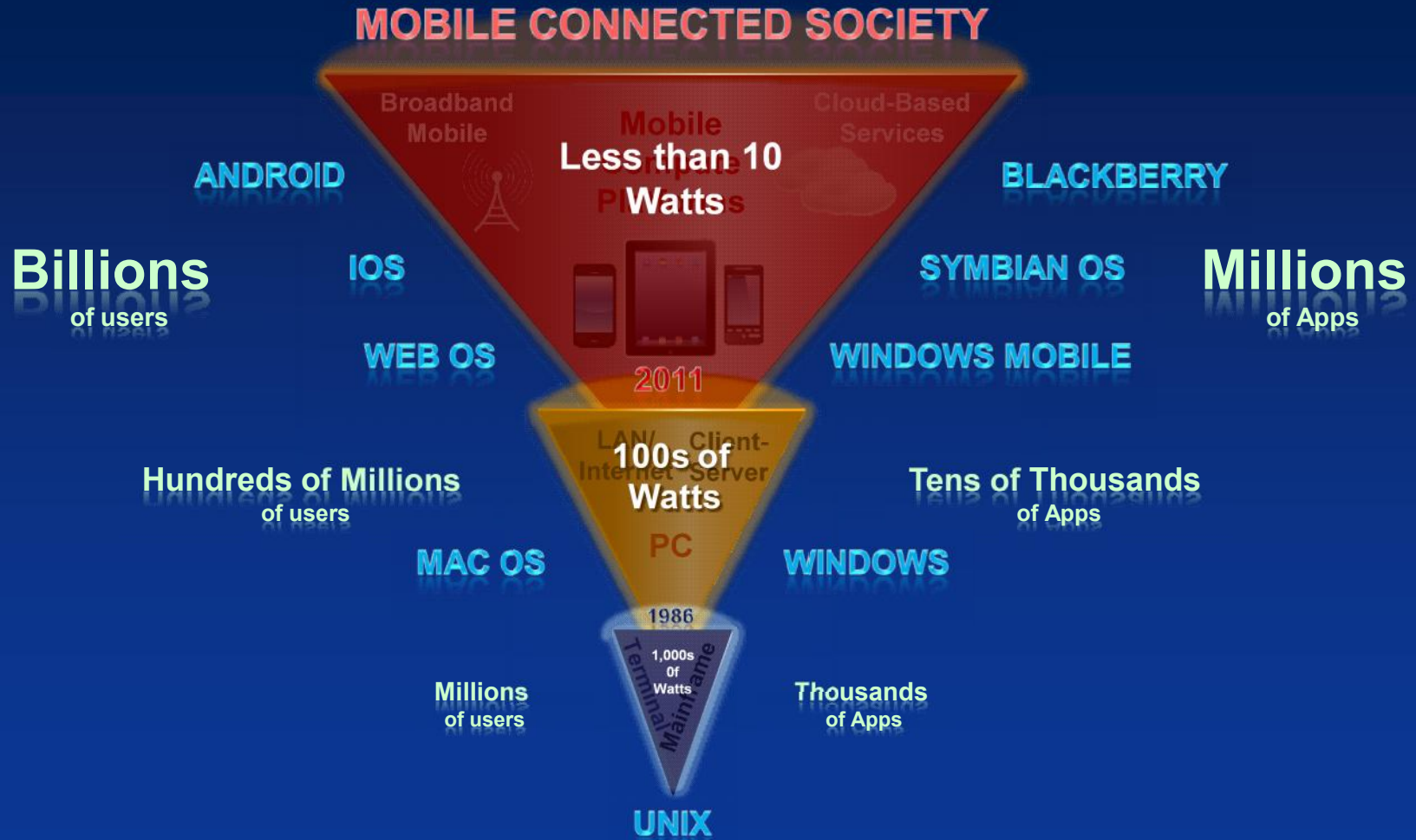
A graphic consisting of two lines that start together at the top and diverge downwards. The left line is light blue and the right line is purple. They both start with a small upward tick, then curve downwards and outwards, ending in a sharp point at the bottom.

***Imaging & Mobile
Requirements Diverging***

The 3rd Wave of Compute Platforms



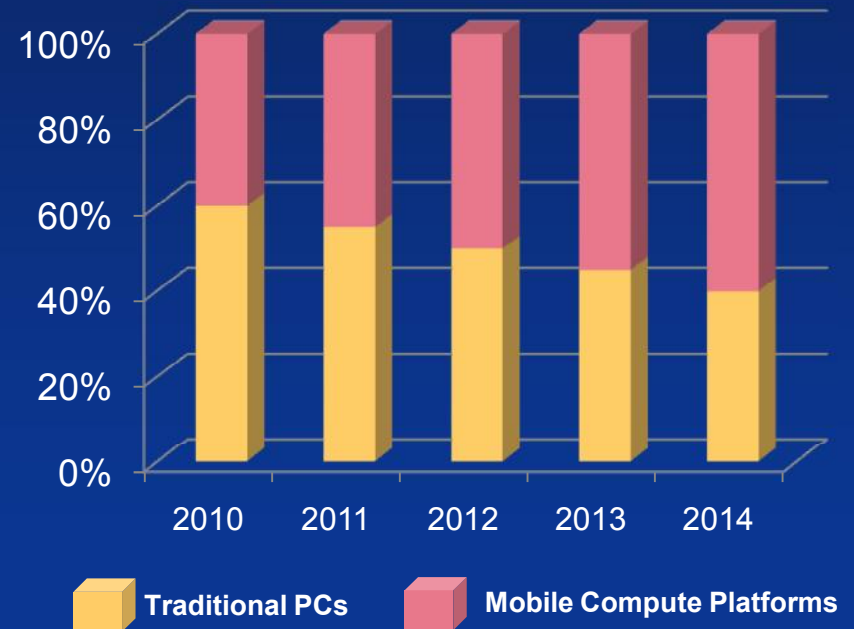
The 3rd Wave of Compute Platforms





The 3rd Wave Growth Opportunity

- SmartPhone and Tablet technology outpacing PC demand
 - Mobile compute platforms
- Trend in towards use as primary compute platform
 - Multiple new OS ecosystems emerging
- Performance now more than just throughput
 - High IOPS & low latency
- Significant new growth expected in Asia
 - Lower cost platforms
 - Feature rich
 - User configurable devices



Santa Clara, CA
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Mobile Usage Trends



Simple Communication	Multi-Media Consumption	User Generated Content	Real-Time Applications	Seamless Lifestyle Connectivity
<ul style="list-style-type: none"> • Voice • SMS • Email 	<ul style="list-style-type: none"> • Music/Ringtone • Video • Web browsing • Memory card for media 	<ul style="list-style-type: none"> • Social networking • Video upload • Multi-media sharing 	<ul style="list-style-type: none"> • Video call • Online gaming • Navigation • Location-based services 	<ul style="list-style-type: none"> • Mobile and Web convergence • 3D interactive gaming

- Increasing storage capacity
- Increasing computing power
- Going from single-threaded to multi-threaded operational model
- Low latency & HIGH IOPS

What's Driving Mobile Performance

Fluid Responsiveness



Interactive 3D Gaming

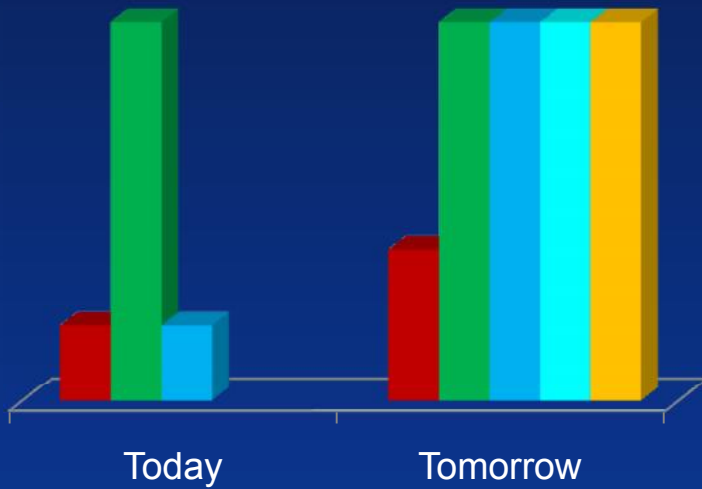


Seamless Web Surfing

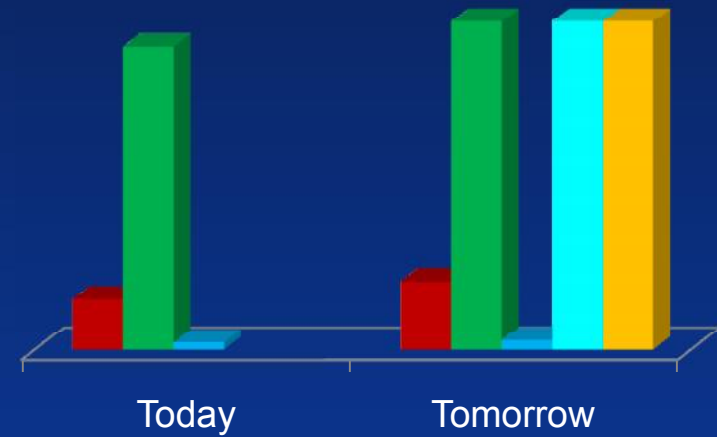


Key Performance Metrics

Sequential Throughput

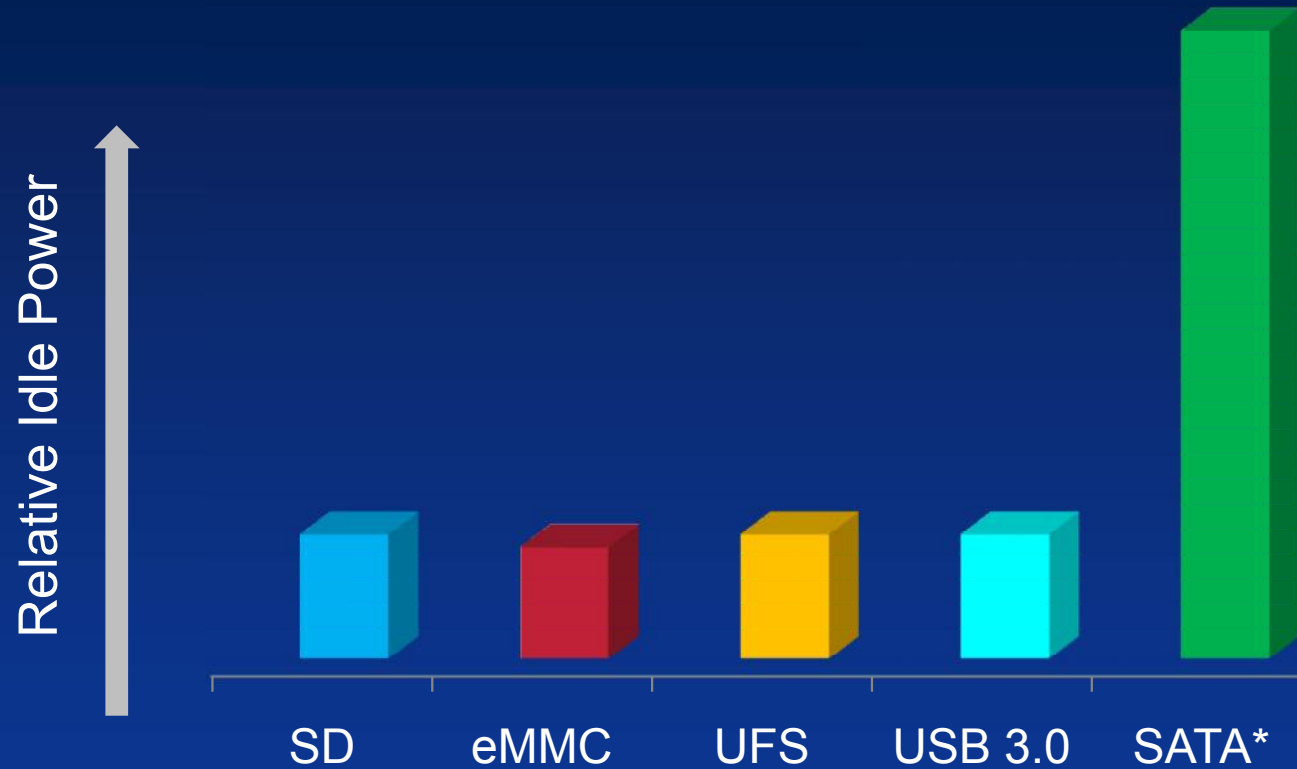


Random IOPS



 eMMC  SATA  SD  USB 3.0  UFS

Power/Performance Optimized for Mobile



* Typical Implementations

Flexible Deployment Options

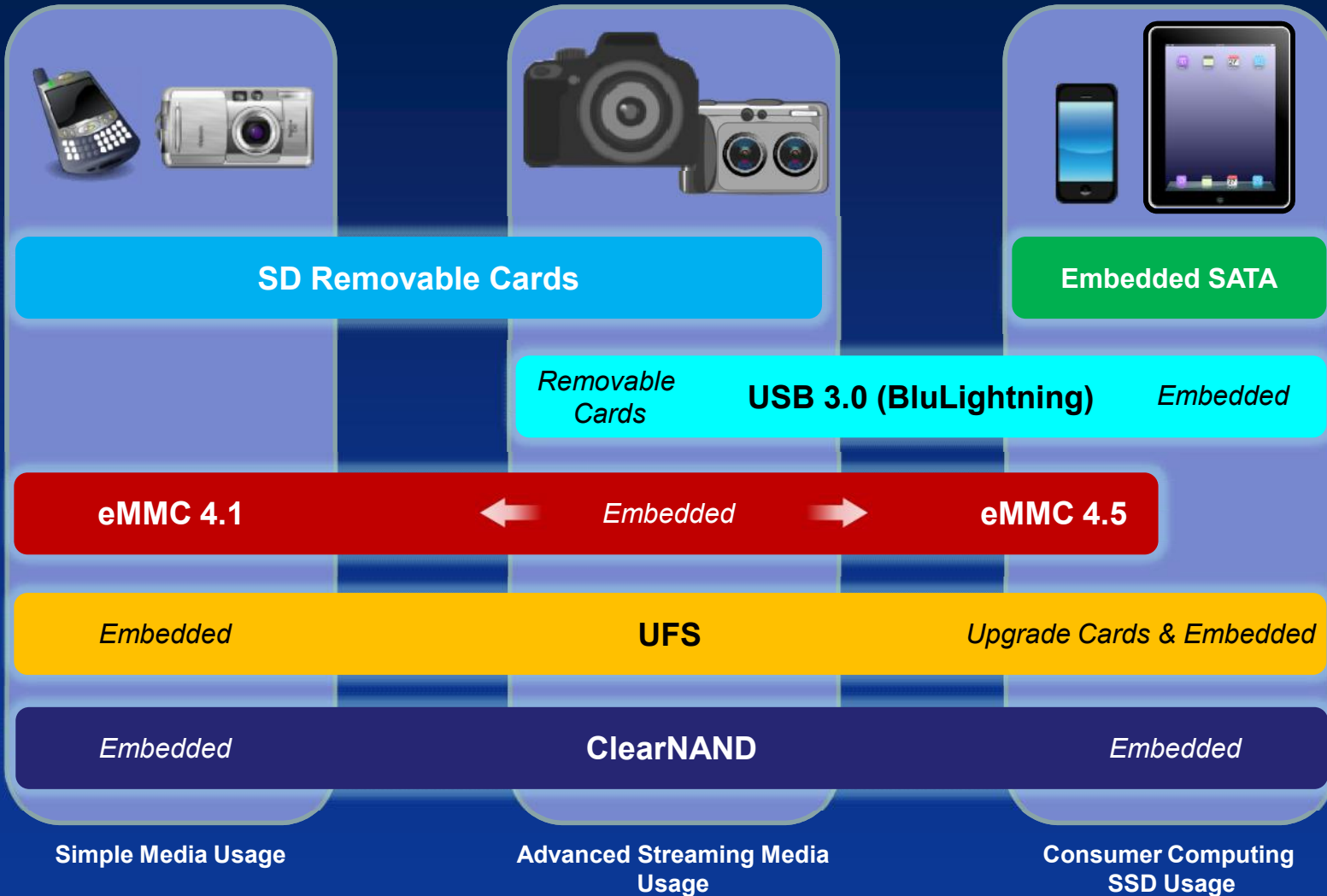
- Embedded SSD
 - Feature & performance rich "out of the box"
 - Premium mobile device & price

- Upgradable SSD card
 - Lower initial price for mobile device
 - Consumer selectable SSD capacity

- Hybrid model
 - Sufficient embedded SSD for applications support
 - Upgrade card slot for incremental SSD functionality
 - Seamless HIGH IOPS performance required



Consumer Storage Alternatives





Thank You