

# Smartphone Computing Architecture

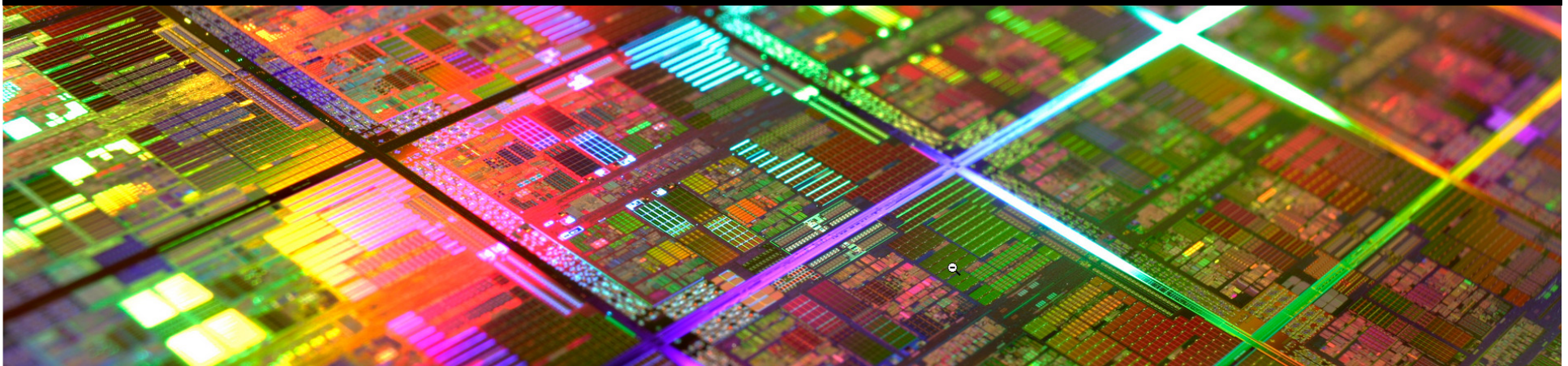
(簡要版)

2013/9/27

梁伯嵩 博士

Bor-Sung Liang, Ph.D

[bsliang@gmail.com](mailto:bsliang@gmail.com)

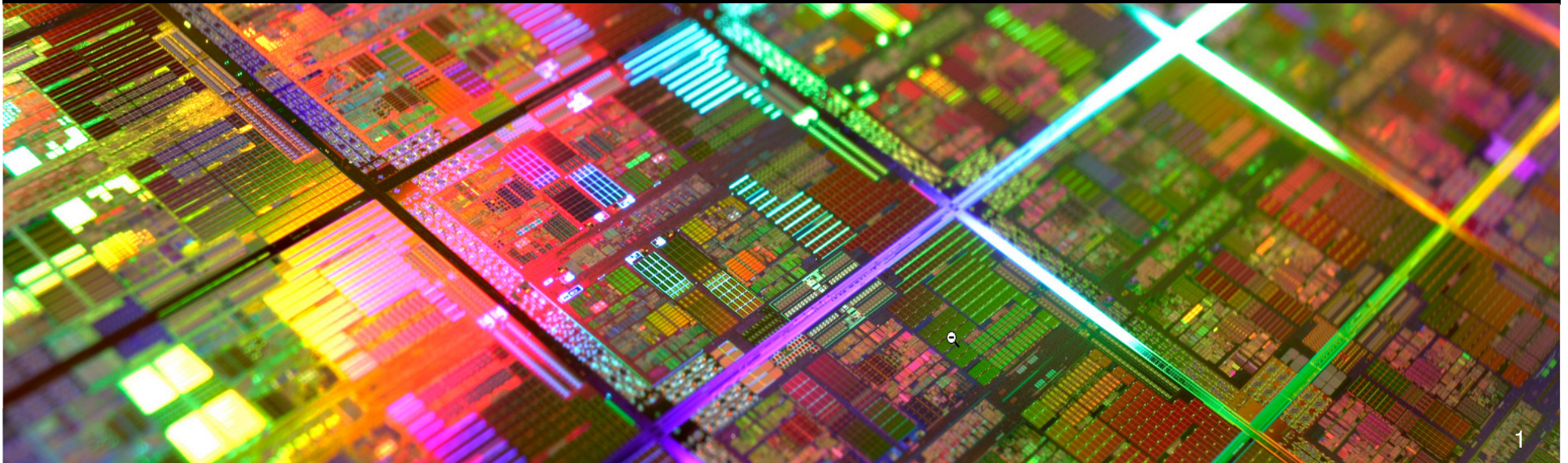


❖ Why we need

## More Computing Power in Smartphone

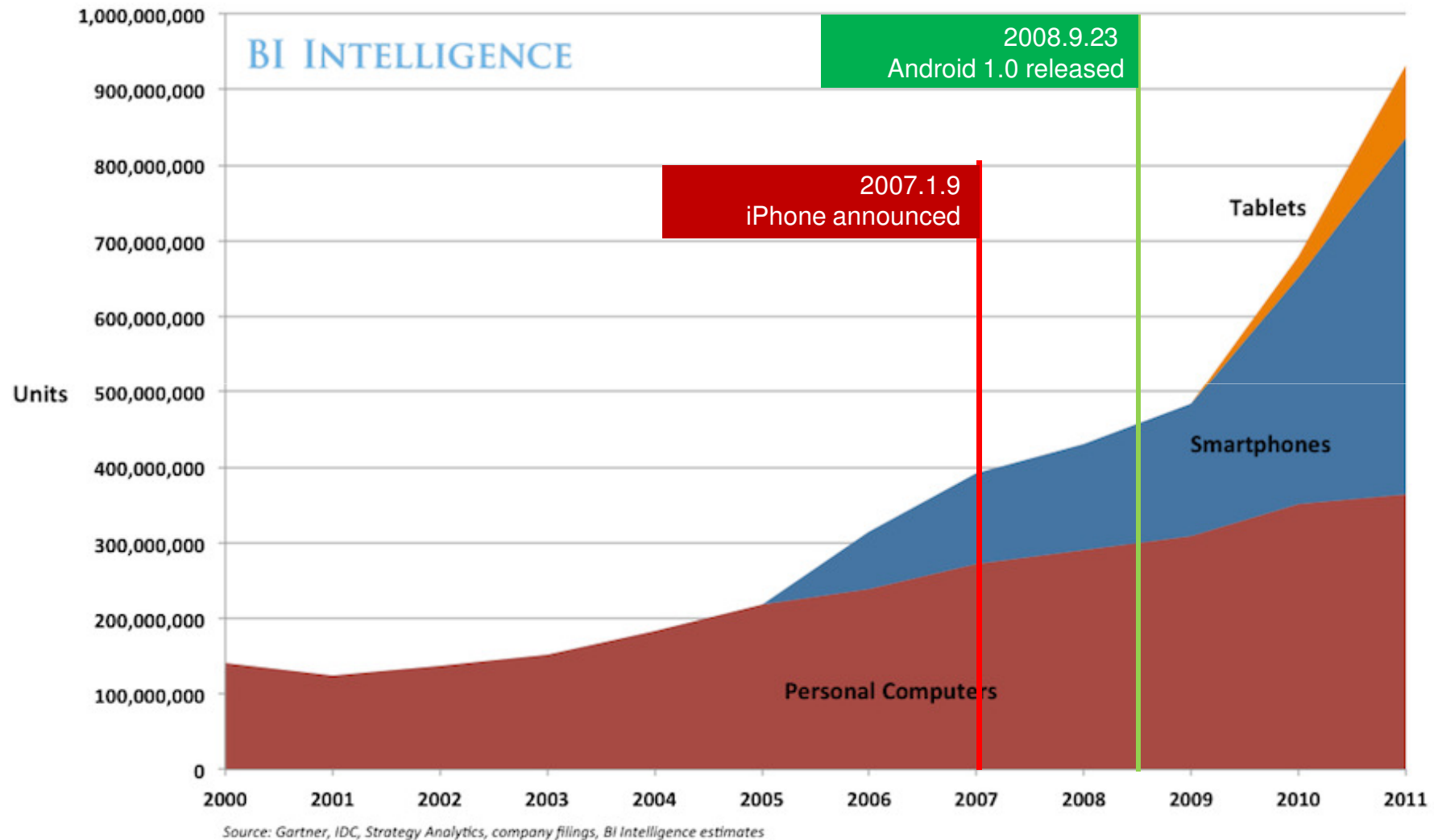
❖ What's Trend of

## Computing Architecture in Smartphone?

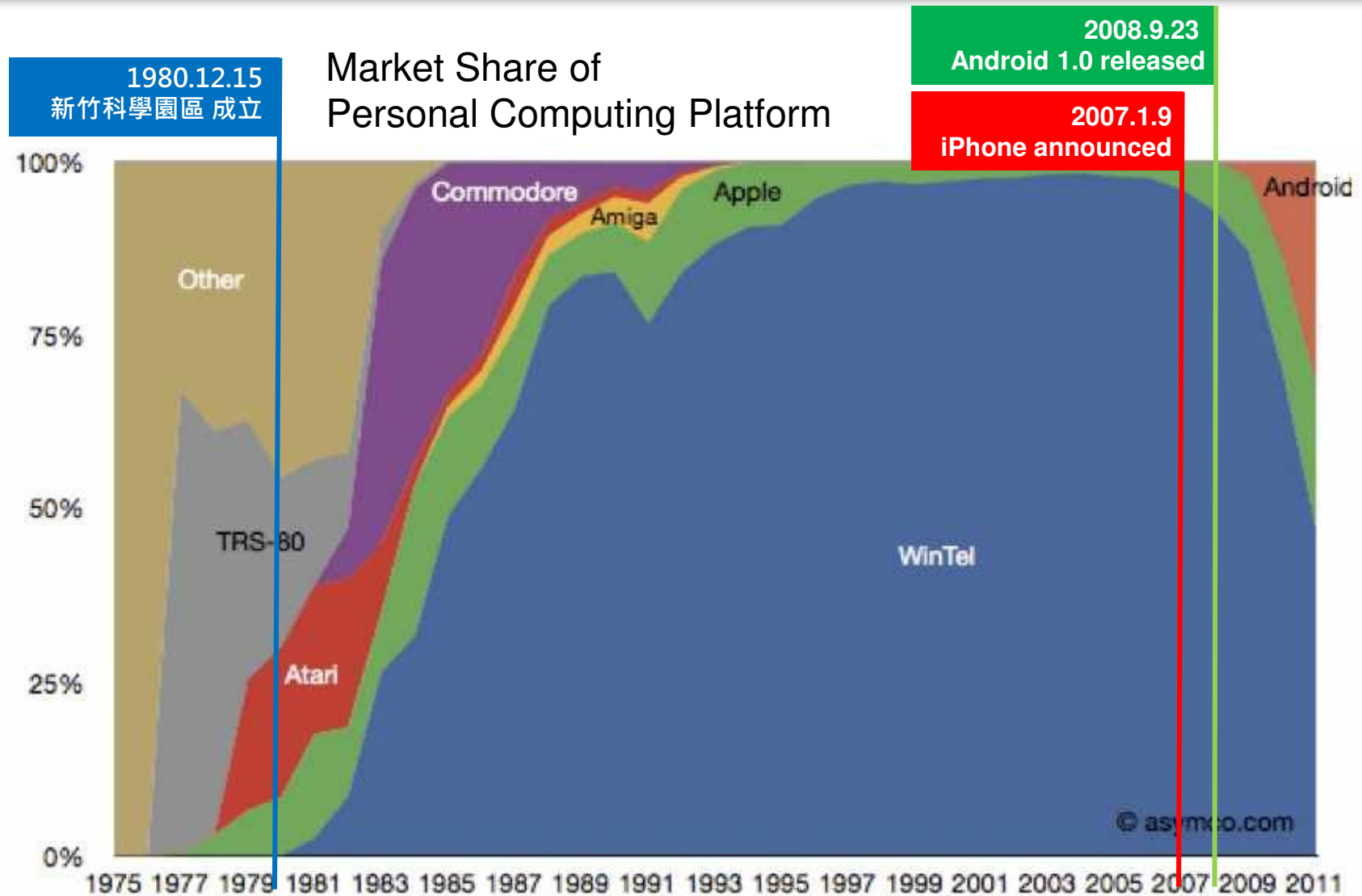


# Global Internet Device : Smartphone Dominated

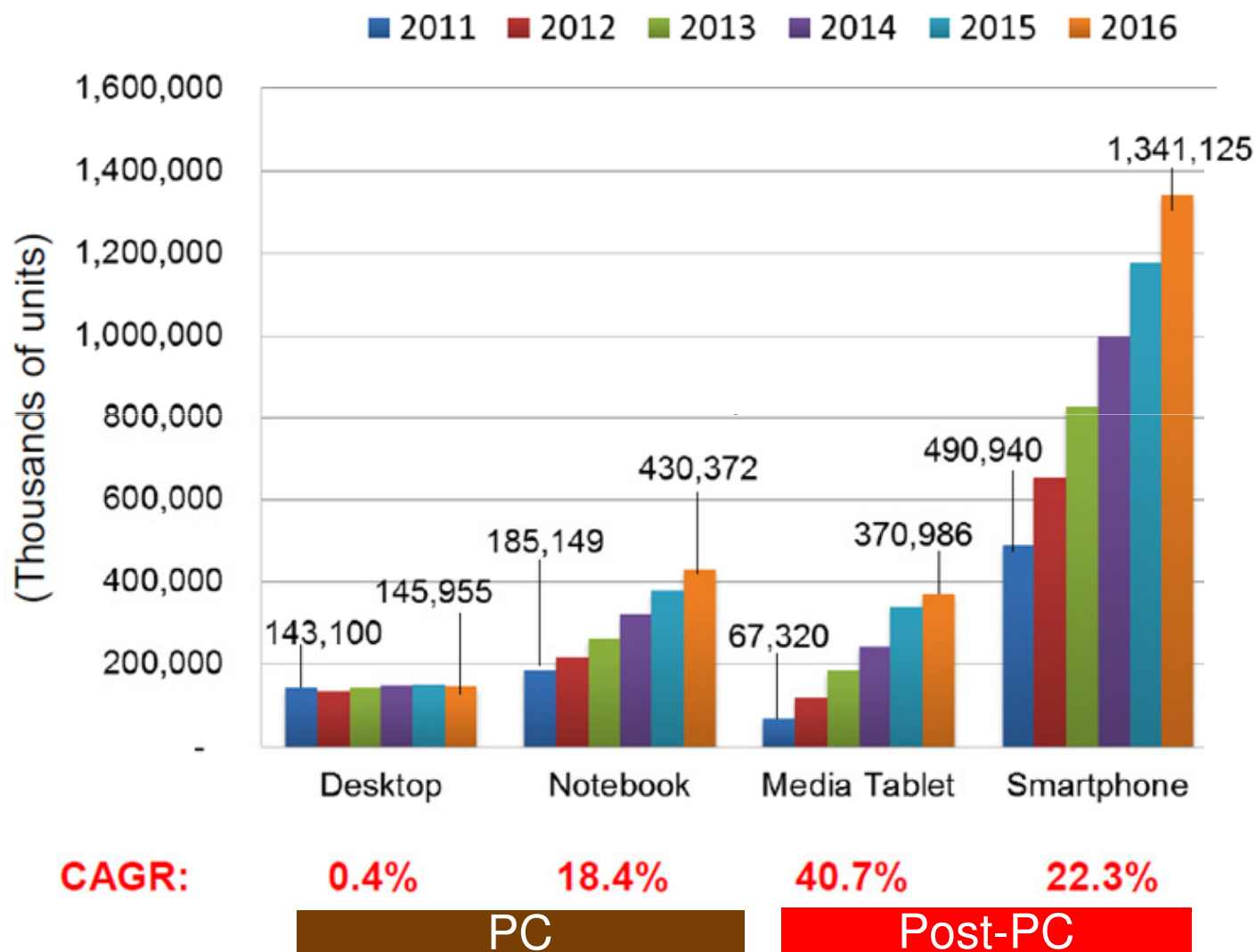
Global Internet Device Sales



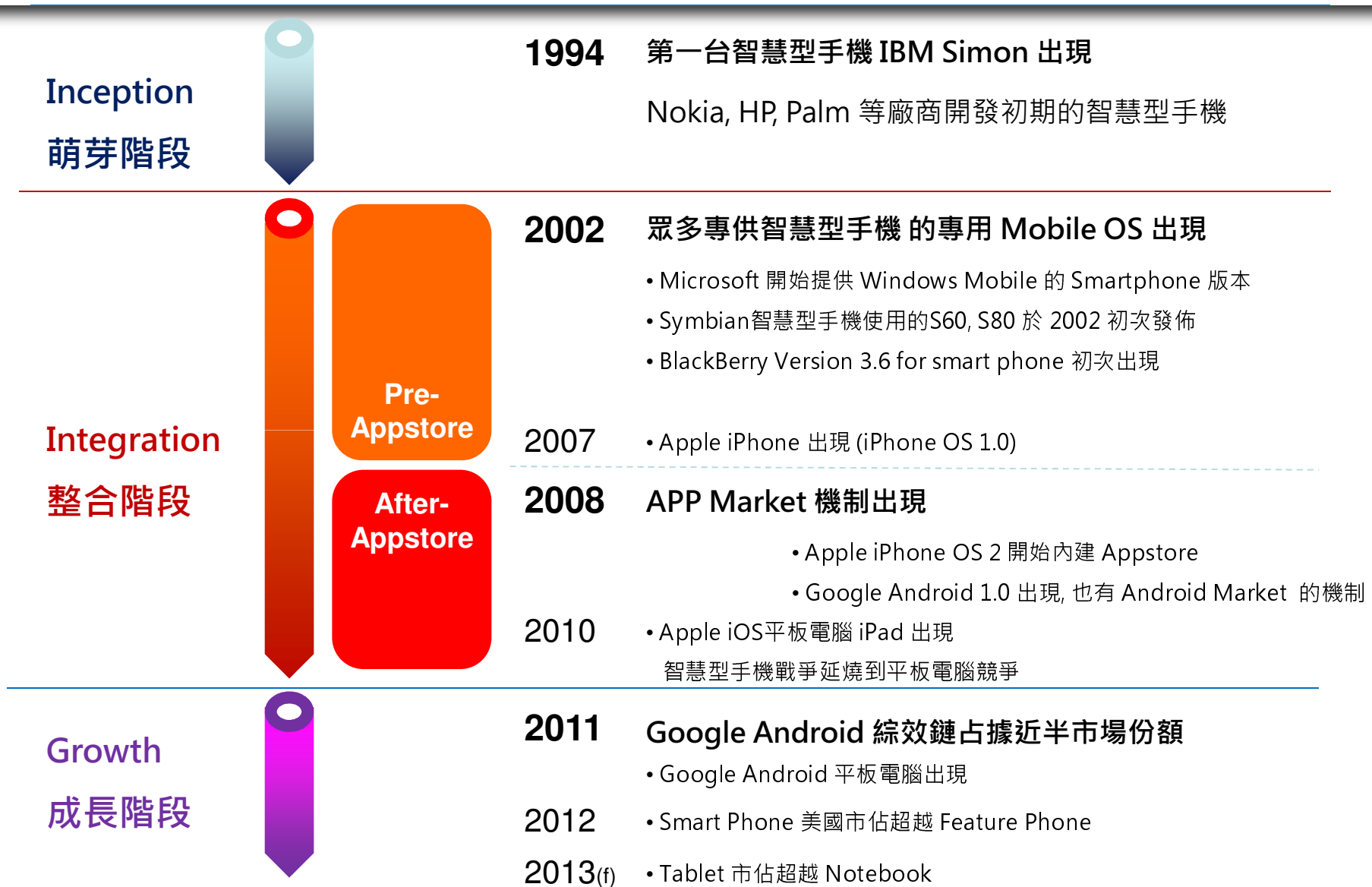
# Post-PC 時代到來



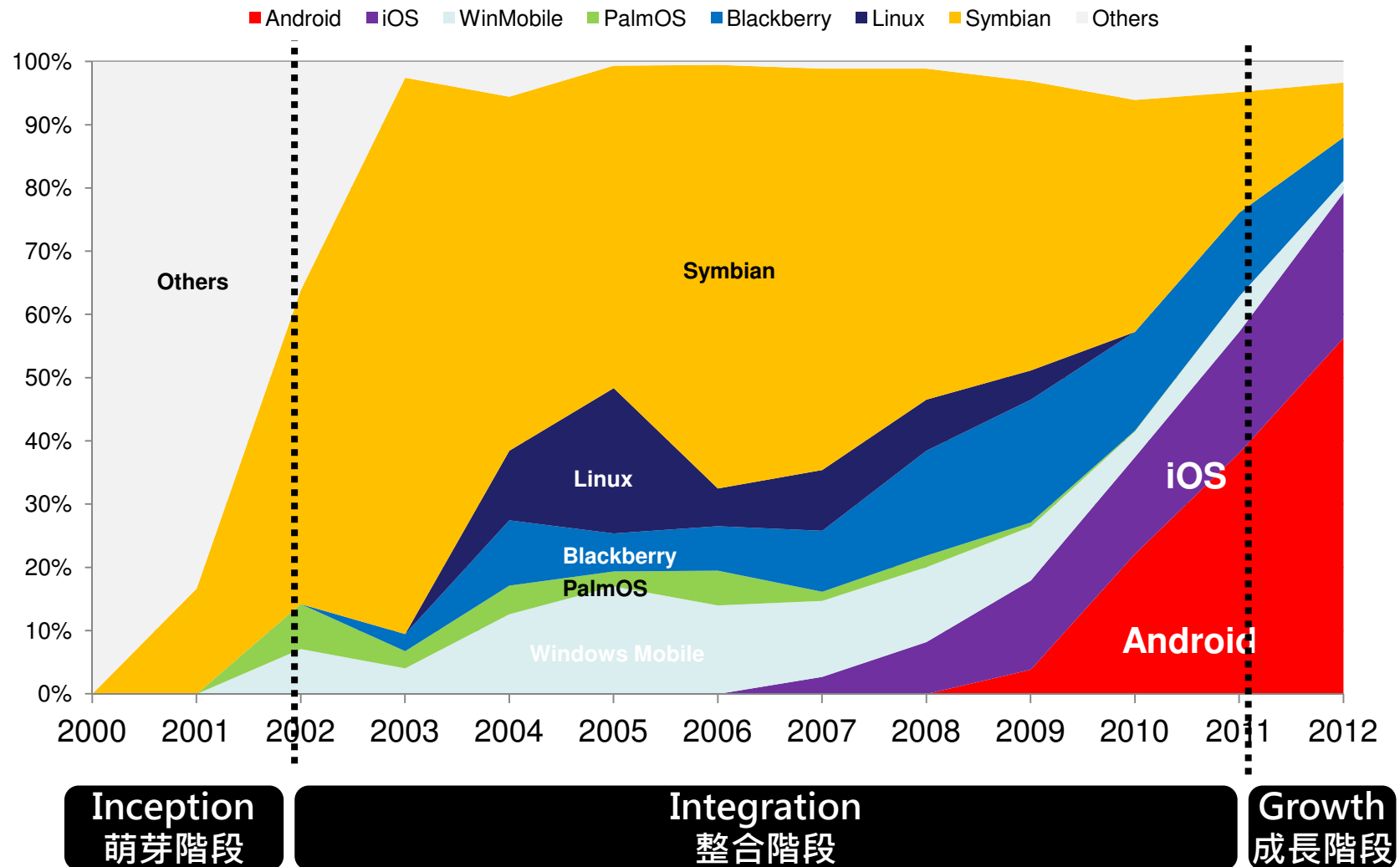
# 資訊產品銷售量成長的變化



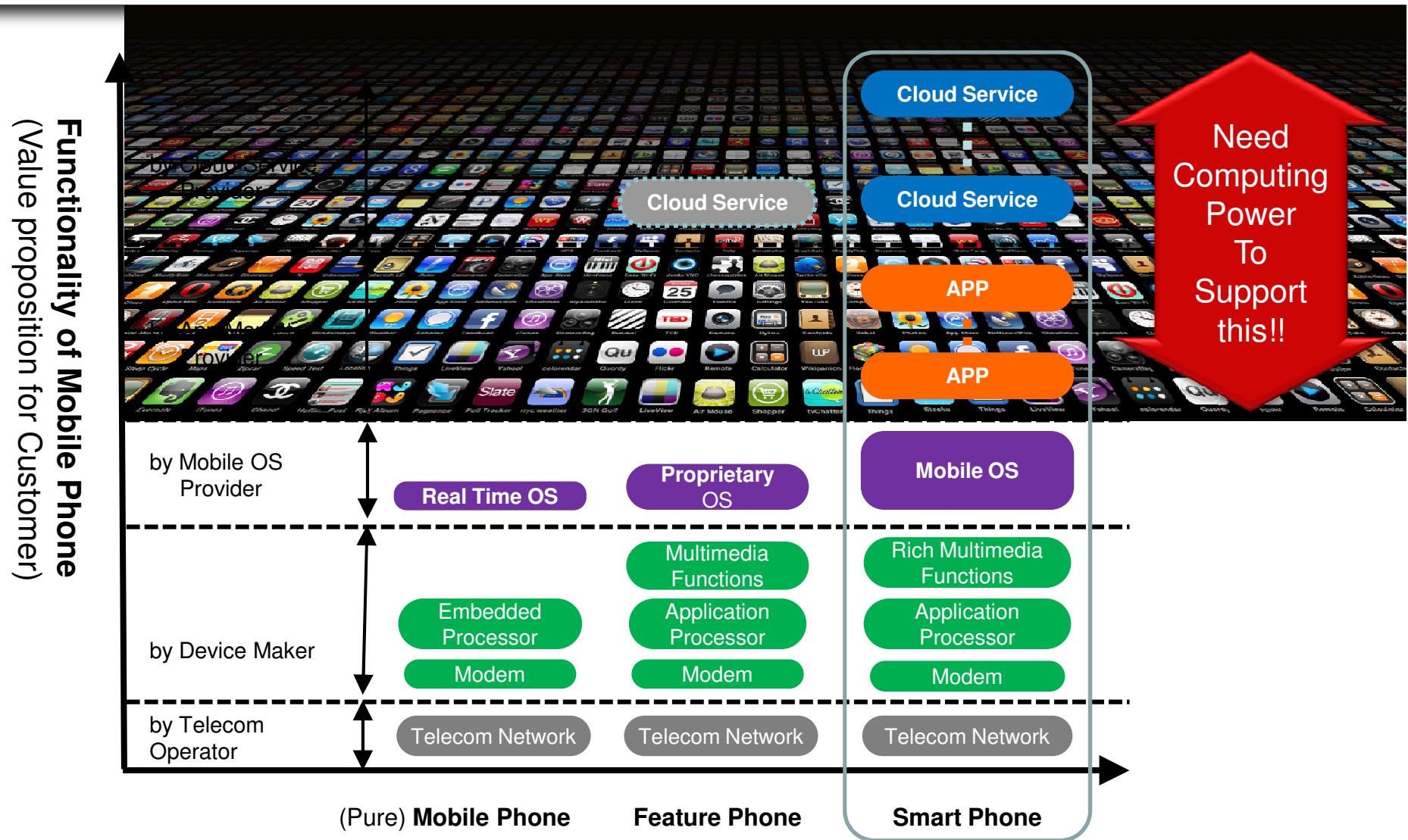
# 智慧型手機綜效鏈之競爭年表



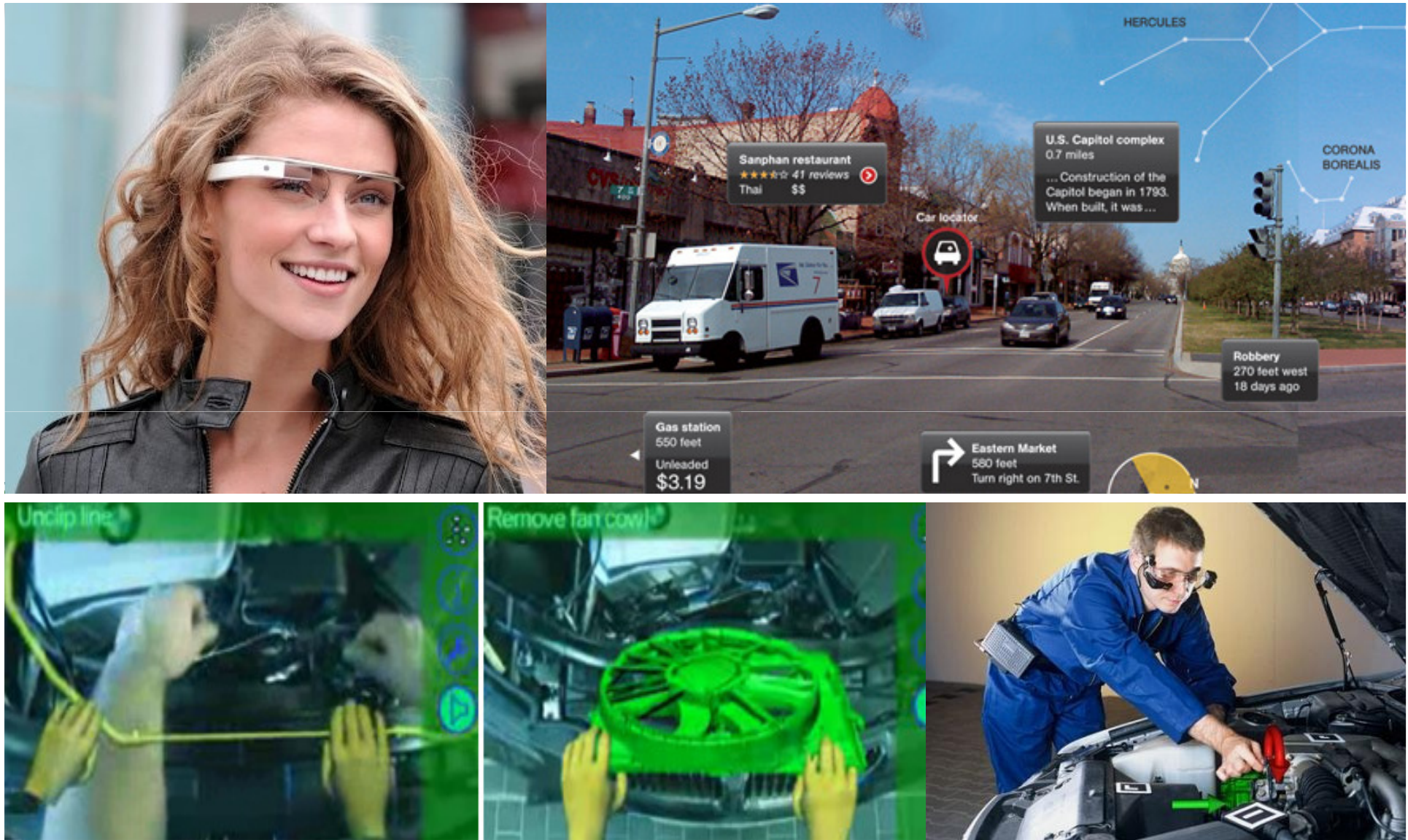
# 智慧型手機綜效鏈生命週期之各廠市佔率



# Smartphone's Value Proposition for Users



# Augmented Reality + Glasses

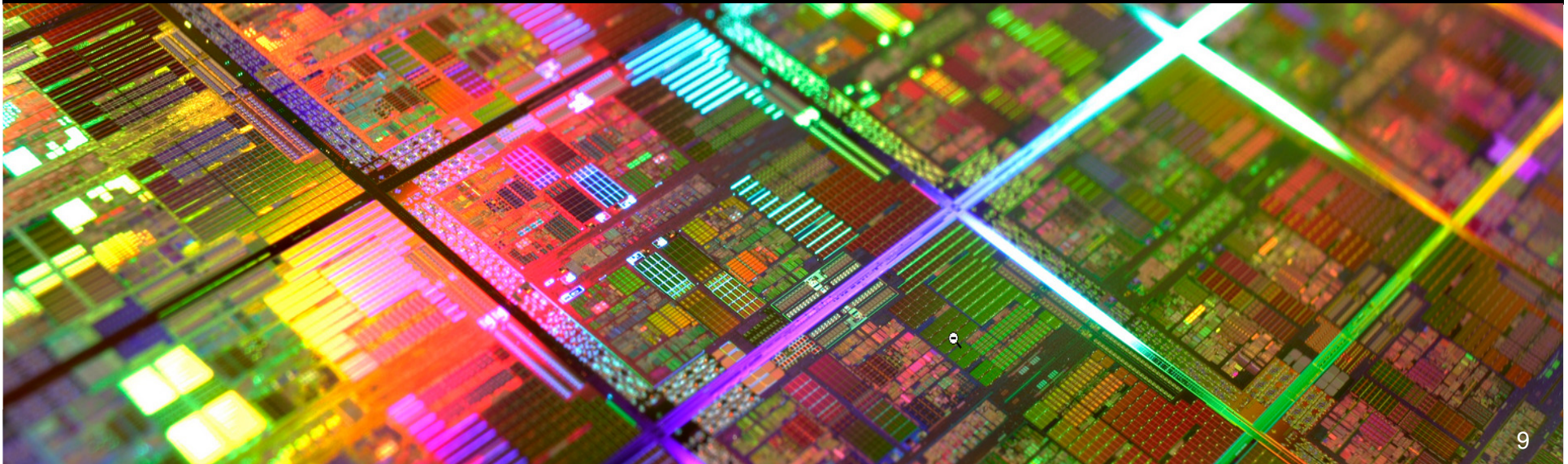


❖ Why we need

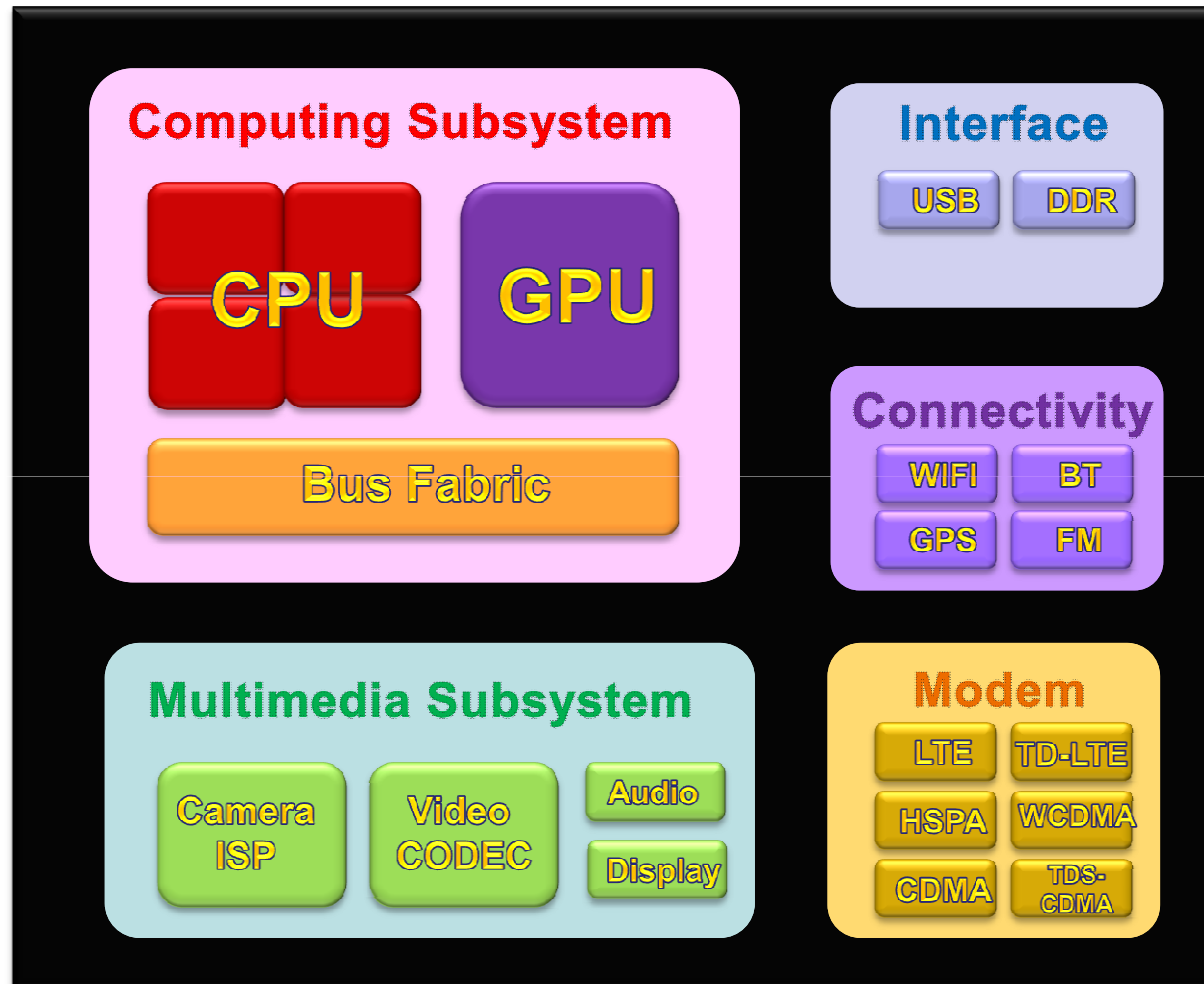
More Computing Power in Smartphone

❖ What's Trend of

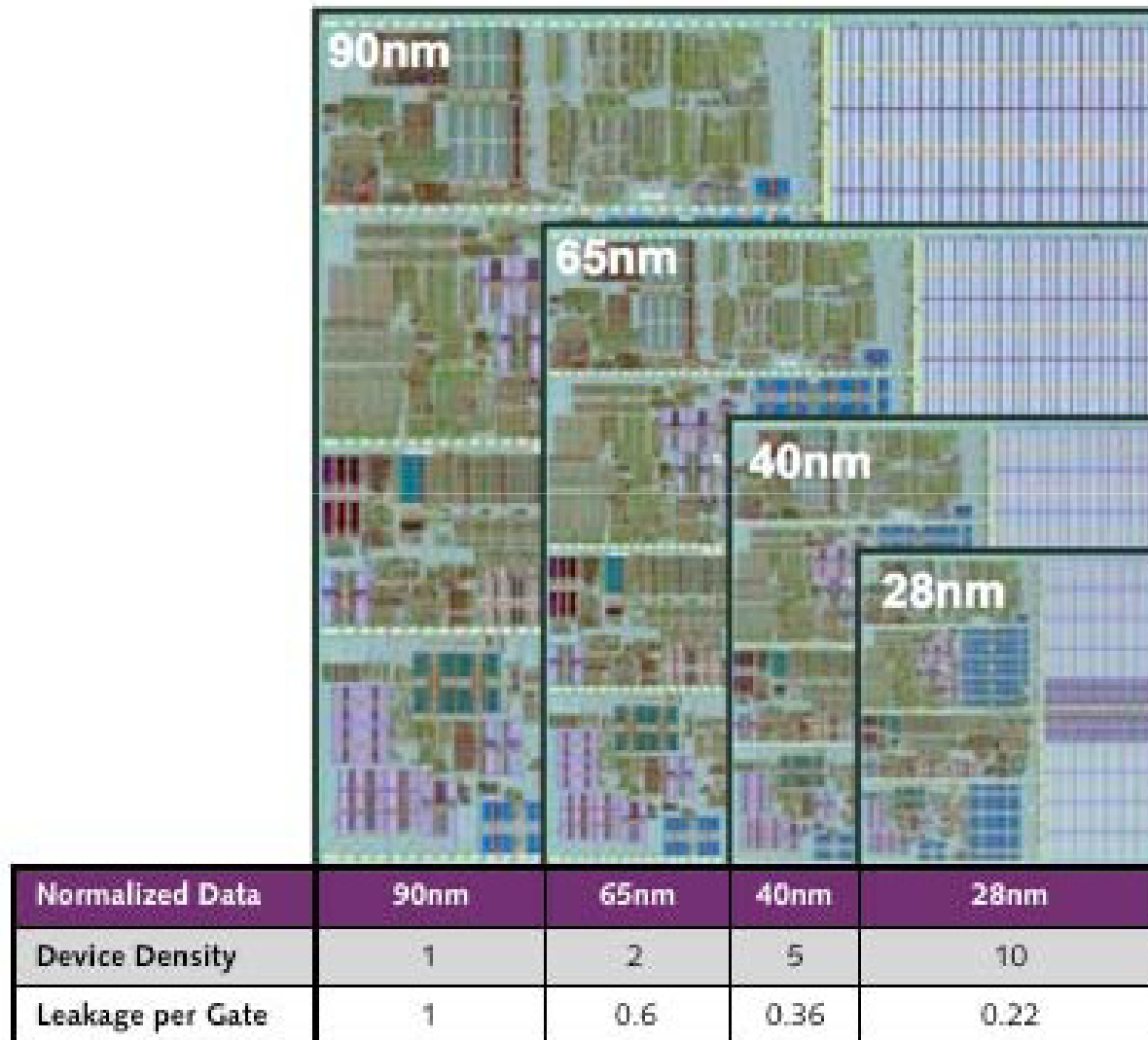
Computing Architecture in Smartphone?



# Application Processor for Smartphone



# Moore's Law: Process



High-*k metalgate* transistors allow chips to keep shrinking while reducing gate leakage, which has become a critical factor in total power consumption.  
(Source: GlobalFoundries)

# Need Power Efficient Architecture

## Power-efficient Architecture

cover both issues

**Battery Life Issue**



**Resource Management  
Mode Switch Issues**



**Thermal Issue**

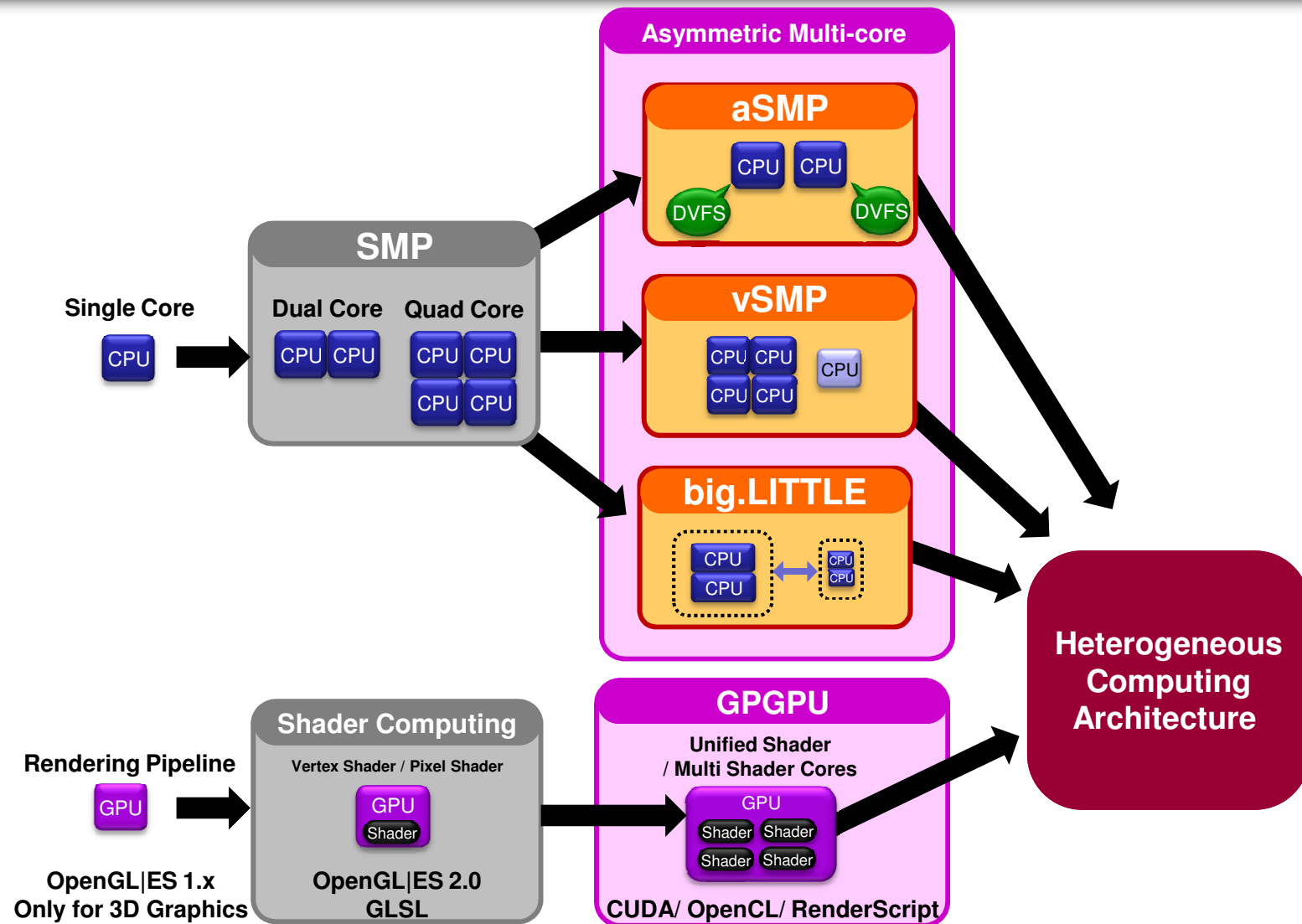


Performance

Low  
Performance  
Area

High  
Performance  
Area

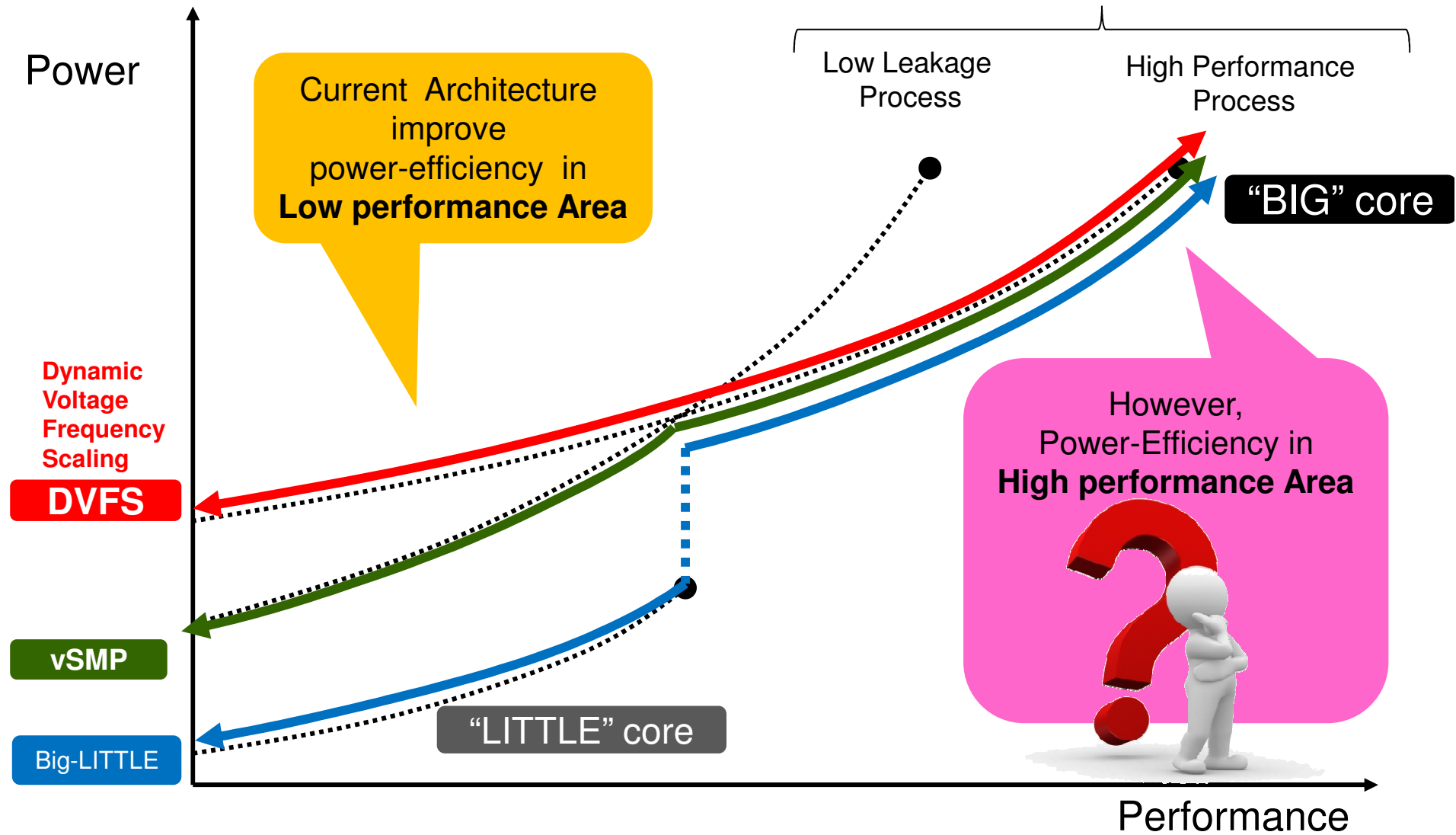
# Trend for Computing Subsystem Architecture



# Trend for Smart Phone Design

|              |                 | 2010                                                        | 2011      | 2012                   | 2013                   | (Future)         |
|--------------|-----------------|-------------------------------------------------------------|-----------|------------------------|------------------------|------------------|
| Process      |                 | 40/45nm                                                     | 40/45nm   | 40/32/28nm             | 28nm                   | ( 20nm, 16nm.. ) |
| Architecture | CPU             | Single-Core                                                 | Dual Core | Dual Core<br>Qual Core | Qual Core<br>Octa Core | ?                |
|              | Power-Efficient | DVFS                      SMP                      aSMP<br> |           |                        |                        |                  |

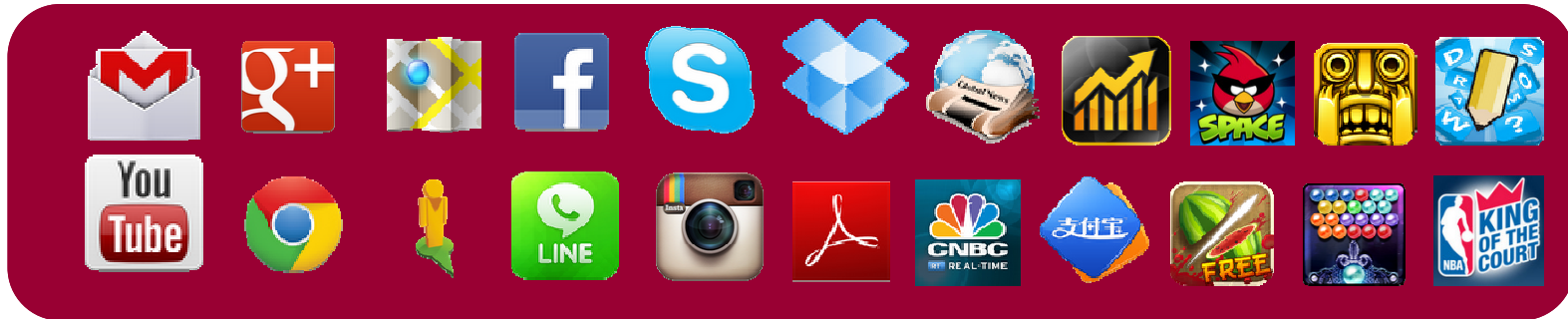
# Power Curve of Power-Efficient Architecture



# Smartphone Computing Architecture



Google Play  
(Android Market)



Various Smart Platform



Different Programming Language



User Scenarios



Heterogeneous Multi-core Computing

**Thank you!**

