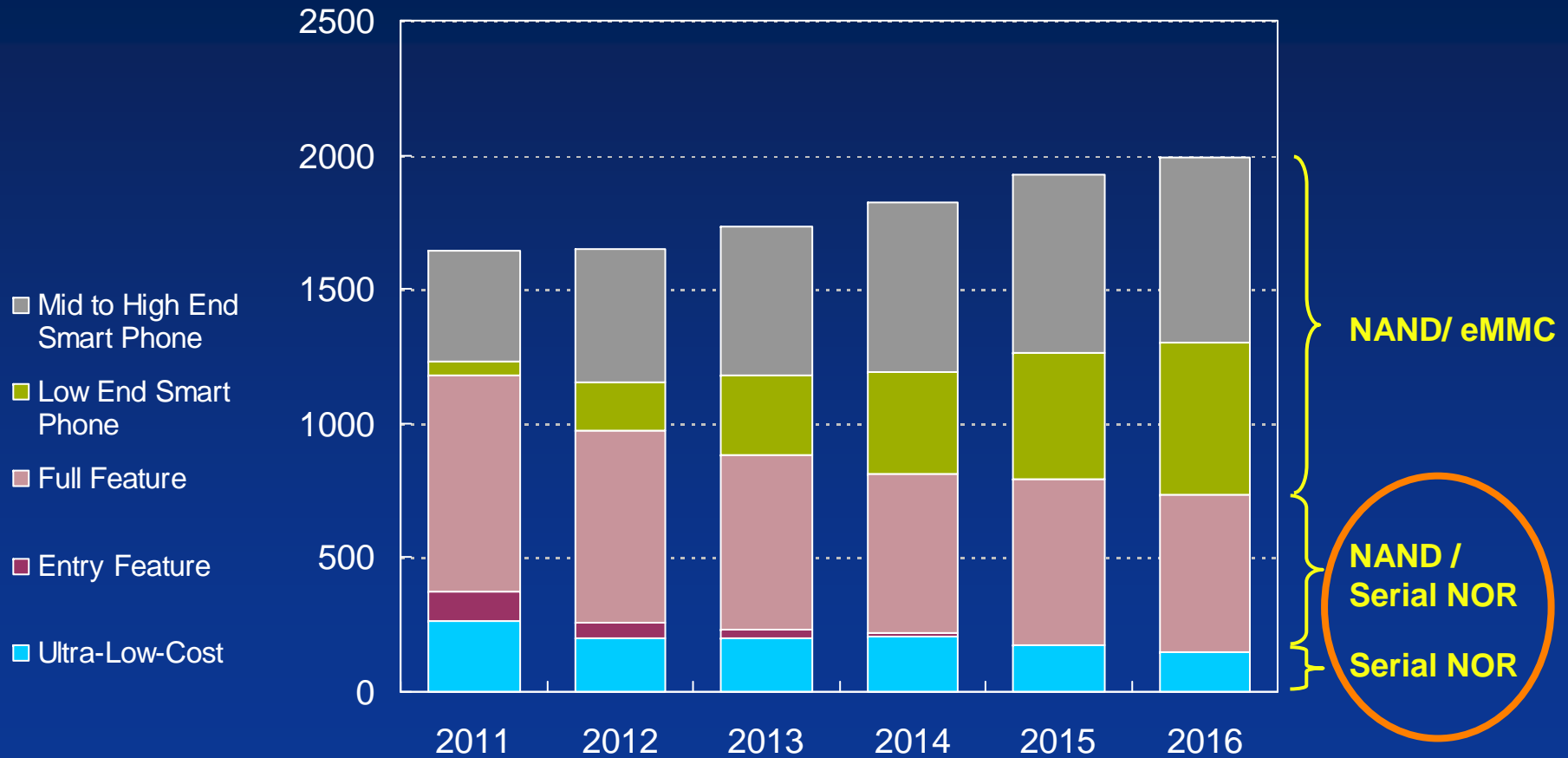




Serial NOR Flash gains Popularity in Feature Mobile Phones

Michael Wang
AVP Emerging System Lab
Macronix Int'l

Mobile Handset Market & Popular Flash Solutions

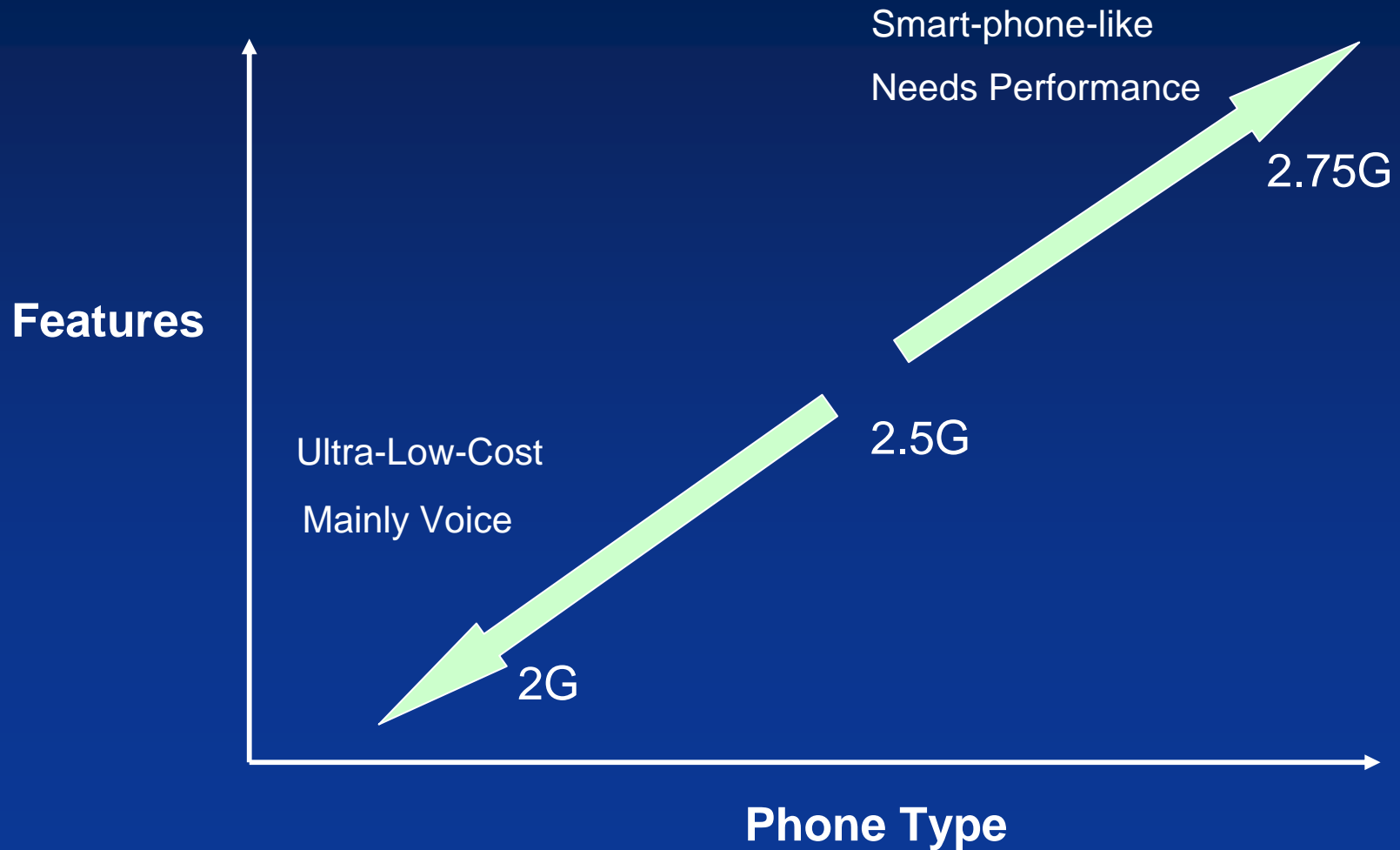


Handset Qty Forecast Source: iSuppli 2012Q2



2.xG is Alive & Well

Focus on “Smart-phone-like” & “Ultra-Low-Cost”

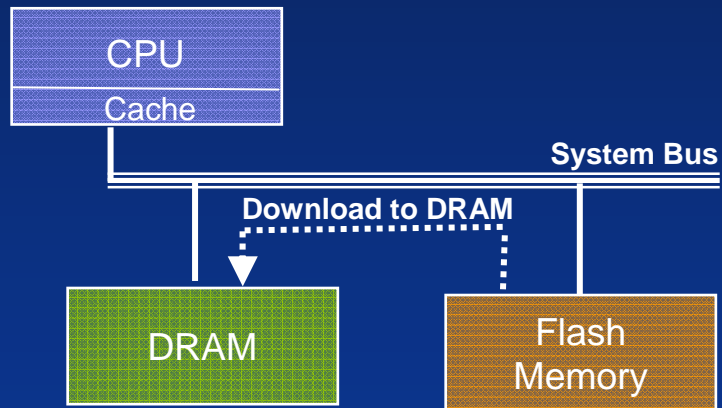




How NOR Flash (code storage) is used?

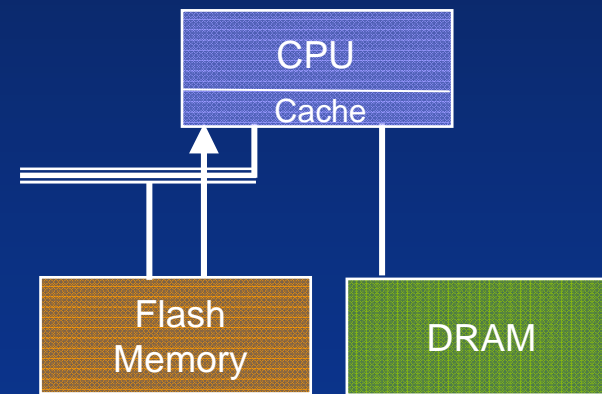
SnD (Store & Download) or **XIP** (Execution in Place)

SnD: Shadowing the code from Flash Memory to DRAM



"Smart-phone-like" Feature Phone :
More sophisticated OS & application

XIP: Direct Access & Execution from Flash Memory

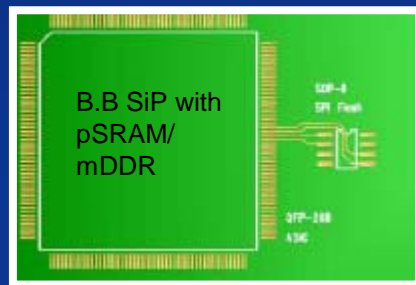


"Ultra-Low-Cost" Feature Phone :
Light-weight OS & simple application

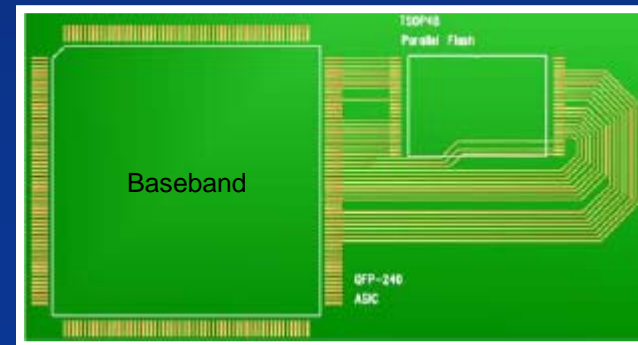


Why does 8-pin Serial NOR become popular?

- Lower overall cost ! (Flash+ASIC_support+PCB_savings)
- Quad-IO improves Serial performance in par with previous Parallel Flash
- Wide range densities (1Mb-256Mb+) with identical footprint in industry standard packages (SOIC / SON)
- Simplifies PCB layout
- Reduces system noise & EMI (esp. pSRAM/mDDR SiP with Baseband)
- Lower power consumption than Parallel Flash
- Well supported by all key NOR vendors with continuous scaling



V.S



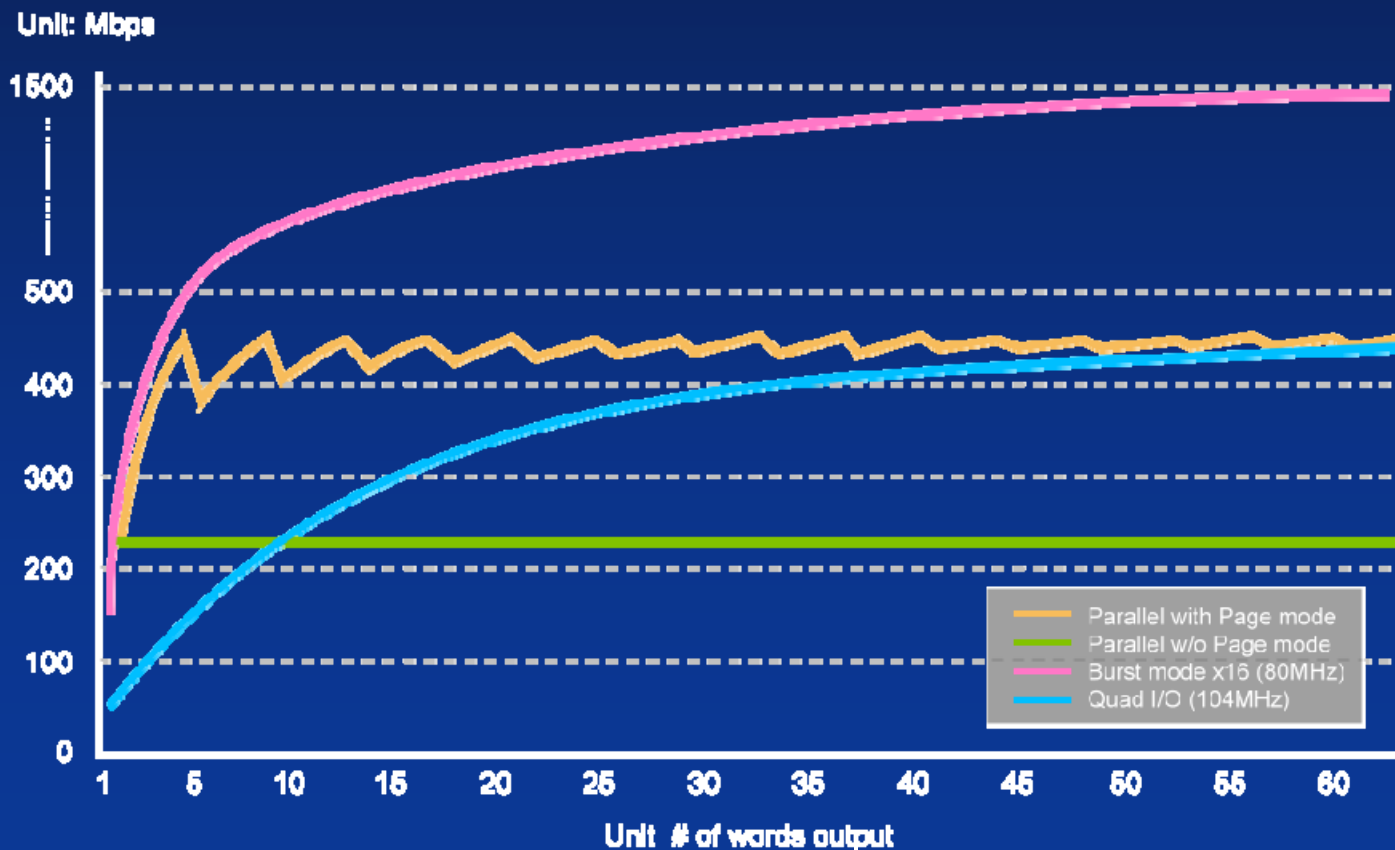
Layout with Discrete Serial Flash

Layout with Parallel Flash MCP



SnD using Quad-IO Serial Flash

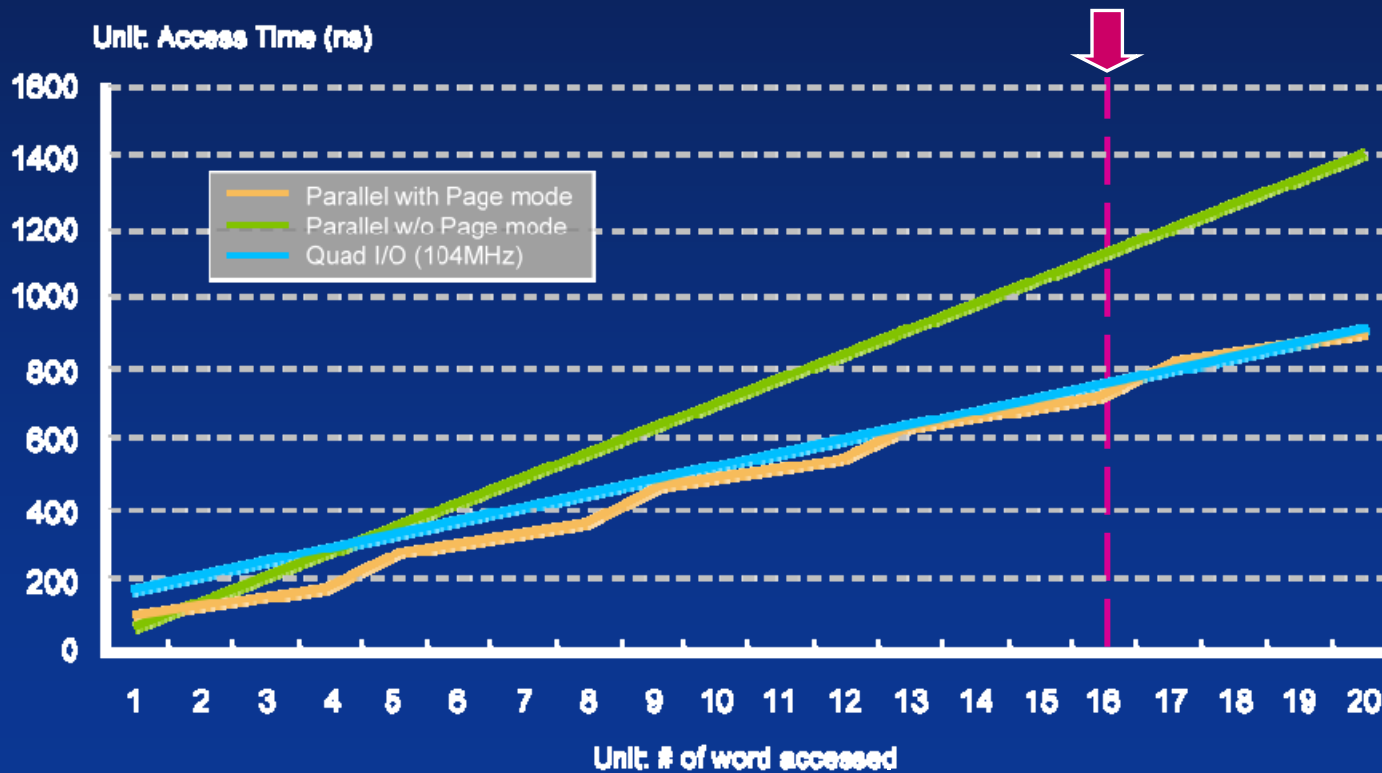
- Quad-IO Serial Flash throughput matches well with page mode parallel Flash for SnD (Large piece of data shadowing from Flash to RAM)





XiP using Quad-I/O Serial Flash

- Quad-I/O Serial Flash also matches page mode parallel Flash access speed for XiP (Small piece of data; e.g. 16 words for cache-line)



Note: Parallel with 70ns; Parallel plus page mode with 90/30ns; MXIC 6-Dummy cycle Fast QPI with 104MHz



Versatile Usage for Serial Flash

Platform Solution
(preferred by OEM
w SW capability)

B.B Chip



8-pin

Discrete
Serial Flash

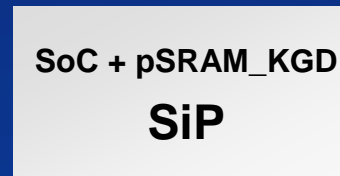
OR



56-pin

MCP
(Serial_Flash +
pSRAM)

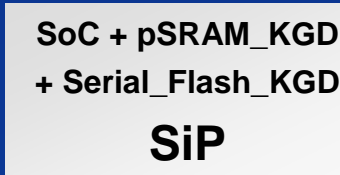
Turn-Key Solution
(preferred by most cost-
sensitive customers)



8-pin

Discrete
Serial Flash

OR





Serial Flash to meet Market Needs

