= Qualcomm Snapdragon =

Snapdragon is a suite of system on a chip (SoC) semiconductor products designed and marketed by Qualcomm for mobile devices . The Snapdragon central processing unit (CPU) uses the ARM RISC instruction set , and a single SoC may include multiple CPU cores , a graphics processing unit (GPU) , a wireless modem , and other software and hardware to support a smartphone 's global positioning system (GPS) , camera , gesture recognition and video . Snapdragon semiconductors are embedded in devices of various systems , including Google Android mobile and Windows Phone devices . They are also used for netbooks , in cars , wearable devices and other devices .

The first Snapdragon product to be made available to consumer device manufacturers was the QSD8250 , which was released in November 2007 . It included the first 1 GHz processor for mobile phones . Qualcomm introduced its " Krait " microprocessor architecture in the second generation of Snapdragon SoCs in 2011 , allowing each processor core to adjust its speed based on the device 's needs . At the 2013 Consumer Electronics Show , Qualcomm introduced the first of the Snapdragon 800 series and renamed prior models as the 200 , 400 and 600 series . Several new iterations have been introduced since , such as the Snapdragon 805 , 810 , 615 and 410 . Qualcomm re @-@ branded its modem products under the Snapdragon name in December 2014 .

= = History = =

= = = Pre @-@ release = = =

Qualcomm announced it was developing the Scorpion central processing unit (CPU) in November 2005 . The Snapdragon system on chip (SoC) was announced in November 2006 and included the Scorpion processor , as well as other semiconductors . This also included Qualcomm 's first custom Hexagon digital signal processor (DSP) .

According to a Qualcomm spokesperson , it was named Snapdragon , because " Snap and Dragon sounded fast and fierce . " The following month , Qualcomm acquired Airgo Networks for an undisclosed amount ; it said Airgo 's 802.11a / b / g and 802.11n Wi @-@ Fi technology would be integrated with the Snapdragon product suite . Early versions of Scorpion had a processor core design similar to the Cortex @-@ A8 .

= = = Early Snapdragon products = = =

The first Snapdragon shipments were of the QSD8250 in November 2007 . According to CNET , Snapdragon 's claim to fame was having the first 1 GHz mobile phone processor . Most smartphones at the time were using 500 MHz processors . The first generation of Snapdragon products supported a 720p resolution , 3D graphics and a 12 @-@ megapixel camera . By November 2008 , 15 device manufacturers decided to embed Snapdragon semiconductors in their consumer electronics products .

In November 2008 , Qualcomm announced it would also compete against Intel in the netbook processor market with dual @-@ core Snapdragon system @-@ on @-@ chips planned for late 2009 . It demonstrated a Snapdragon processor that consumed less power than Intel chips announced around the same time and claimed it would also cost less when released . That same month , Qualcomm introduced a Snapdragon @-@ based protoytpe netbook called Kayak that used 1 @.@ 5 GHz processors and was intended for developing markets .

In May 2009 , Java SE was ported and optimized for Snapdragon . At the November 2009 Computex Taipei show , Qualcomm announced the QSD8650A addition to the Snapdragon product suite , which was based on 45 nanometer manufacturing processes . It featured a 1 @.@ 2 GHz processor and had lower power consumption than prior models .

= = = Adoption = = =

By late 2009 , smartphone manufacturers announced they would be using Snapdragon semiconductors in the Acer Liquid Metal , HTC HD2 , Toshiba TG01 and the Sony Ericsson Xperia X10 . Lenovo announced the first netbook product using Snapdragon SoCs that December . According to PC World , mobile devices using Snapdragon had better battery life and were smaller in size than those using other SoCs .

By June 2010 , Snapdragon chips were embedded in 20 available consumer devices and incorporated into 120 product designs in development . Apple had a dominant market position for smartphones at the time and did not incorporate Snapdragon into any of its products . The success of Snapdragon therefore relied on competing Android phones , such as Google 's Nexus One and the HTC Incredible , challenging Apple 's market position . Android devices did end up taking market share from the iPhone and predominantly used Snapdragon . As of July 2014 , the market share of Android phones had grown to 84 @.@ 6 percent .

There was an " unconfirmed but widely circulated report " speculating that Apple was going to start using Snapdragon SoCs in Verizon @-@ based iPhones . As of 2012 , Apple was still using their own semiconductor designs . Support for desktop Windows operating systems was added to Snapdragon in October 2010 . By 2011 Snapdragon was embedded in Hewlett Packard 's WebOS devices and had a 50 % market share of a $ 7 @.@ 9 billion smartphone processor market . By 2015 , Snapdragon was used in most non @-@ Apple smartphones .

Snapdragon chips are also used in most Android @-@ based smartwatches , Snapdragon products have also been used in virtual reality products , in vehicles like the Maserati Quattroporte and Cadillac XTS and in other applications .

= = = Later models = = =

In June 2010 , Qualcomm began sampling the third generation of Snapdragon products ; two dual @-@ core 1 @.@ 2 GHz system on chips (SoC) called the Mobile Station Modem (MSM) 8260 and 8660 . The 8260 was for GSM , UMTS and HSPA + networks , while the 8660 was for CDMA2000 and EVDO networks . That November Qualcomm announced the MSM8960 for LTE networks .

In early 2011 , Qualcomm announced a new processor architecture called Krait , which used the ARM v7 instruction set , but was based on Qualcomm 's own processor design . The processors were called S4 and had a feature named Asynchronous Symmetrical Multi @-@ Processing (aSMP) , meaning each processor core adjusted its clock speed and voltage based on the device 's activity in order to optimize battery usage . Prior models were renamed to S1 , S2 and S3 to distinguish each generation .

The S4 @-@ based generation of Snapdragon SoCs began shipping to product manufacturers with the MSM8960 in February 2012 . In benchmark tests by Anandtech , the MSM8960 had better performance than any other processor tested . In an overall system benchmark , the 8960 obtained a score of 907 , compared to 528 and 658 for the Galaxy Nexus and HTC Rezound respectively . In a Quadrant benchmark test , which assesses raw processing power , a dual @-@ core Krait processor had a score of 4 @,@ 952 , whereas the quad @-@ core Tegra 3 was just under 4 @,@ 000 . The quad @-@ core version , APQ8064 , was made available in July 2012 . It was the first Snapdragon SoC to use Qualcomm 's Adreno 320 graphics processing unit (GPU) .

= = = Recent developments = = =

Adoption of Snapdragon contributed to Qualcomm 's transition from a wireless modem company to one that also produces a wider range of hardware and software for mobile devices . In July 2011 Qualcomm acquired certain assets from GestureTek in order to incorporate its gesture recognition intellectual property into Snapdragon SoCs . In mid @-@ 2012 Qualcomm announced the Snapdragon software development kit (SDK) for Android devices at the Uplinq developer conference . The SDK includes tools for facial recognition , gesture recognition , noise cancellation

and audio recording . That November Qualcomm acquired some assets from EPOS Development in order to integrate its stylus and gesture recognition technology into Snapdragon products . It also collaborated with Microsoft to optimize Windows Phone 8 for Snapdragon semiconductors .

= = Description and current models = =

Snapdragon system on chip products typically include a graphics processing unit (GPU) , a global positioning system (GPS) and a cellular modem integrated into a single circuit board . It has software included that operates graphics , video and picture @-@ taking . There are 14 different Snapdragon products under the 200 , 400 , 600 and the 800 series spanning from low to high @-@ end respectively . Some of their components include the Adreno graphics processing , the Qualcomm Hexagon DSP and processors using Qualcomm 's S4 processor architecture . In addition to smartphones , the 400 series is used in smart watches and the 602A is intended for electronics in cars .

The current Snapdragon naming schema was implemented after the Snapdragon 800 family was announced at the 2013 Consumer Electronics Show ; prior models were renamed to the 200 , 400 or 600 series . The 400 family is entry @-@ level , the 600 is mass @-@ market or mid @-@ range , and 800 family is for high @-@ end phones .

The entry @-@ level 200 series was expanded with six new processors using 28 nanometer manufacturing and dual or quad @-@ core options in June 2013 . The Snapdragon 805 was released that November . The 410 , which is intended for low @-@ cost phones in developing nations , was announced the following month . In January 2014 , Qualcomm introduced a modified version of the Snapdragon 600 called 602A that is intended for in @-@ car infotainment screens , backup cameras , and other driver assistance products . The quad @-@ core Snapdragon 610 and eight @-@ core 615 were announced in February 2014 . The Snapdragon 808 and 810 were announced in April 2014 . As of July 2014 , the 810 contained the fastest processor in the Snapdragon line .

The entry @-@ level Snapdragon 210 , intended for low @-@ cost phones , was announced in September 2014 . In February 2015 , Qualcomm re @-@ branded its stand @-@ alone modem products under the Snapdragon name ; they were distinguished from SoCs using the " x " designation , such as the X7 or X12 modem .

According to CNET , these phones were growing in US market share and ranked highly in CNET reviews due to their responsiveness . Snapdragon SoCs are also used in most Windows phones and most phones entering the market in mid @-@ 2013 . The LG G2 was the first phone to market using the Snapdragon 800 in August 2013 .

= = = Benchmark tests = = =

Benchmark tests of the Snapdragon 800 's processor by PC Magazine found that its processing power was comparable to similar products from Nvidia . Benchmarks of the Snapdragon 805 found that the Adreno 420 GPU resulted in a 40 percent improvement in graphics processing over the Adreno 330 in the Snapdragon 800 , though there was only slight differences in processor benchmarks . Benchmarks of the Snapdragon 801 inside an HTC One found a " bump all around " in benchmark improvements over the 800 . In 2015 , Samsung 's decision not to use the Snapdragon 810 in its upcoming Galaxy S6 , had a significant detrimental impact on Snapdragon 's revenues and reputation . Benchmark tests by Ars Technica confirmed rumors that the 810 under @-@ performed lower @-@ end models and had overheating issues . A Qualcomm spokesperson said these tests were done with early versions of the 810 that weren ? t ready for commercial use . An updated version was released and was found to moderately improve thermal throttling , GPU clock speeds , memory latency , and memory bandwidth when tested in a commercial product , the Xiaomi Mi Note Pro .