Broadwell (microarchitecture)

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Broadwell is Intel's codename for the 14 nanometer die shrink of its Haswell microarchitecture. It is a "tick" in Intel's tick-tock principle as the next step in semiconductor fabrication.[1][2][3] Like some of the previous tick-tock iterations, Broadwell did not completely replace the full range of CPUs from the previous microarchitecture (Haswell), as there were no low-end desktop CPUs based on Broadwell.[4]

Some of the processors based on the Broadwell microarchitecture are marketed as "5th-generation Core" i3, i5 and i7 processors. This moniker is however not used for marketing of the Broadwell-based Celeron, Pentium or Xeon chips. This microarchitecture also introduced the Core M processor branding.

Broadwell's H and C variants will be used in conjunction with Intel 9 Series chipsets (Z97, H97 and HM97), in addition to retaining backward compatibility with some of the Intel 8 Series chipsets.[5]

Broadwell

CPUID code	0306D4h
Product code	80658 (mainstream desktop/mobile, Xeon E3) 80660 (Xeon E5) 80669 (Xeon E7) 80671 (enthusiast desktop) 80674 (Xeon D)
Cores	2–4 (mainstream) 6–10 (enthusiast) 4–22 (Xeon)
L1 cache	64 KB per core
L2 cache	256 KB per core
L3 cache	2–6 MB (shared)
L4 cache	128 MB of eDRAM (Iris Pro models only)
Created	2014
Transistors	14 nm transistors (Tri-Gate)
Architecture	Broadwell x86
Instructions	MMX, AES-NI, CLMUL, FMA3
Extensions	x86-64 SSE, SSE2, SSE3, SSSE3, SSE4, SSE4.1, SSE4.2 AVX, AVX2, TXT, TSX VT-x, VT-d
Socket(s)	LGA 1150 rPGA 947 BGA 1364 LGA 2011-v3
Predecessor	Haswell (Tock/Architecture) Haswell Refresh (Optimization)
Successor	Skylake (Architecture)
GPU	HD 5300 HD 5500 HD 5700P HD 6000 HD 6100 HD 6200 HD 6300P HD Graphics
Brand name(s)	Core i3 Core i5 Core i7 Core M Celeron Pentium Xeon

Contents

Design and variants

Broadwell has been launched in three major variants:[6]

- BGA package:
  - *Broadwell-Y*: system on a chip (SoC); 4.5 W and 3.5 W thermal design power (TDP) classes, for tablets and certain ultrabook-class implementations. GT2 GPU will be used, while maximum supported memory is 8 GB of LPDDR3-1600.[7] These will be the first chips to roll out, and are expected for Q3/Q4 2014. At Computex 2014, Intel announced that these chips will be branded as *Core M*.[8] TSX instructions are disabled in this series of processors because a bug that cannot be fixed with a microcode update exists.[9]
  - *Broadwell-U*: SoC; two TDP classes – 15 W for 2+2 and 2+3 configurations (two cores with a GT2 or GT3 GPU) as well as 28 W for 2+3 configurations.[10] Designed to be used on motherboards with the PCH-LP chipset for Intel's ultrabook and NUC platforms. Maximum supported is up to 16 GB of DDR3 or LPDDR3 memory, with DDR3-1600 and LPDDR3-1867 as the maximum memory speeds. The 2+2 configuration is scheduled for Q4 2014, while the 2+3 is estimated for Q1 2015.[6] For Broadwell-U models with integrated 5x00 GPUs, die size is 82 mm^2 with a total of 1.3 billion transistors, while for the models with 6100 and 6200 GPUs the die size is 133 mm^2 with a total of 1.9 billion transistors.
  - *Broadwell-H*: 37 W and 47 W TDP classes, for motherboards with HM86, HM87, QM87 and the new HM97 chipsets for "all-in-one" systems, mini-ITX form-factor motherboards, and other small footprint formats. It may come in two different variants, as single and dual chips; the dual chips (4 cores, 8 threads) will have GT3e and GT2 GPU, while a single chip (SoC; two cores, four threads) will have GT3e GPU. Maximum supported memory is 32 GB of DDR3-1600.[7] These are scheduled for Q2 2015.[6]
- LGA 1150 socket:
  - *Broadwell-DT*: quad-core unlocked desktop version with GT3e integrated graphics (Iris Pro 6200) and 128 MB of eDRAM L4 cache, in a 65 W TDP class. Announced to be backward compatible with the LGA 1150 motherboards designed for Haswell processors.[11]
- LGA 2011-v3 socket:
  - *Broadwell-EP*: to be marketed as Xeon E5-2600 v4 etc., while using the C610 Wellsburg chipset platform. Up to 22 cores and 44 threads, up to 55 MB of total cache and 40 PCI Express 3.0 lanes, with 55–160 W TDP classes. Maximum supported memory speed is quad-channel DDR4-2400.[12]
  - *Broadwell-EX*: *Brickland* platform, for mission-critical servers. Intel QuickPath Interconnect (QPI) is expected to be updated to version 1.1, enabling seamless scaling beyond eight-socket systems. Maximum supported memory speeds are expected to be DDR3-1600 and DDR4-1866.[13][14] Up to 24 core and 48 threads, up to 60 MB of L3 cache and 32 PCI Express 3.0 lanes, with 115–165 W TDP.
  - Broadwell-E: HEDT platform, for enthusiasts. With a maximum of 10 cores it is said to be released during computex, and subsequently was released in July 2016. Consisting of four processors: the 6800K, 6850K, 6900K, and the deca-core 6950X with clock speeds ranging from 3 GHz to 3.9 GHz as well as up to 25 mb of L3

cache, however over clocking these processors has seen a max overclock headroom of 4.3 GHz stable .[15]

Instruction set extensions

Broadwell introduces some instruction set architecture extensions:[16][17]

- Intel ADX: `ADOX` and `ADCX` for improving performance of arbitrary-precision integer operations[18]
- `RDSEED` for generating 16-, 32- or 64-bit random numbers from a thermal noise entropy stream, according to NIST SP 800-90B and 800-90C[19]
- `PREFETCHW` instruction[19]
- Supervisor Mode Access Prevention (SMAP) – optionally disallows access from kernel-space memory to user-space memory, a feature aimed at making it harder to exploit software bugs.
- Transactional Synchronization Extensions: This instruction set is reintroduced for all versions of Broadwell except for Broadwell-Y because a bug that cannot be fixed via microcode update in Broadwell-Y and all versions of Haswell except for the Haswell-EX variants has been fixed with a new CPU stepping level.[9]

New features

Broadwell's Intel Quick Sync Video hardware video decoder adds VP8 hardware decoding[20] and encoding[21] support. It adds VP9 and HEVC 10-bit decoding support through the integrated GPU.[22] Also, it will have two independent bit stream decoder (BSD) rings to process video commands on GT3 GPUs; this will allow one BSD ring to process decoding and the other BSD ring to process encoding at the same time.[23]

Broadwell's integrated GPU supports on Windows Direct3D 11.2, OpenGL 4.4 (OpenGL 4.5 on Linux[24]) and OpenCL 2.0.[25][26][27] However, it is marketed as Direct3D-12-ready.[28] Broadwell-E introduced Intel Turbo Boost Max Technology 3.0.[29]

List of Broadwell processors

Desktop processors

Target segment	Cores (threads)	Processor branding and model		GPU model	CPU frequency		TDP	Graphics clock rate		L3 cache	L4 cache[a]	Release date	Price (USD)	Socket
					Base	Turbo		Base	Max					
Performance	4 (8)	Core i7	**5775C (http://ark.intel.com/products/88040)**	Iris Pro 6200	3.3 GHz	3.7 GHz	65 W	300 MHz	1.15 GHz	6 MB	128 MB	June 2, 2015[30]	$366	LGA 1150
Mainstream	4 (4)	Core i5	**5675C (http://ark.intel.com/products/88095)**		3.1 GHz	3.6 GHz			1.1 GHz	4 MB			$276	

"Broadwell-E" (14 nm)

Model number	sSpec number	Cores	Frequency	Turbo	L2 cache	L3 cache	TDP	Socket	I/O bus	Memory	Release date	Part number(s)	Release price (USD)
Core i7-6950X	SR2PA	10	3 GHz	3.5 GHz	10 × 256 KB	25 MB	140 W	LGA 2011-3	DMI 2.0	4 × DDR4-2400	30 May 2016	BX80671I76950X BXC80671I76950X	$1723
Core i7-6900K	SR2PB	8	3.2 GHz	3.7 GHz	8 × 256 KB	20 MB	140 W	LGA 2011-3	DMI 2.0	4 × DDR4-2400	2016	BX80671I76900K BXC80671I76900K	$1089
Core i7-6850K	SR2PC	6	3.6 GHz	3.8 GHz	6 × 256 KB	15 MB	140 W	LGA 2011-3	DMI 2.0	4 × DDR4-2400	2016	BX80671I76850K BXC80671I76850K	$617
Core i7-6800K	SR2PD	6	3.4 GHz	3.6 GHz	6 × 256 KB	15 MB	140 W	LGA 2011-3	DMI 2.0	4 × DDR4-2400	2016	BX80671I76800K BXC80671I76800K	$434

Embedded processors

Target segment	Cores (threads)	Processor branding and model		GPU model	CPU frequency		TDP	Graphics clock rate		L3 cache	L4 cache[a]	Release date	Price (USD)	Socket
					Base	Turbo		Base	Max					
Performance	4 (8)	Core i7	**5775R (http://ark.intel.com/products/87718)**	Iris Pro 6200	3.3 GHz	3.8 GHz	65 W	300 MHz	1.15 GHz	6 MB	128 MB	June 2, 2015[30]	$348	BGA 1364
Mainstream	4 (4)	Core i5	**5675R (http://ark.intel.com/products/87715)**		3.1 GHz	3.6 GHz			1.1 GHz	4 MB			$265	
			5575R (http://ark.intel.com/products/87714)		2.8 GHz	3.3 GHz			1.05 GHz				$244	
Server	4 (8)	Xeon E3	**1284Lv4 (http://ark.intel.com/products/88045)**	Iris Pro P6300	2.9 GHz	3.8 GHz	47 W		1.15 GHz	6 MB			OEM	
			1278Lv4 (http://ark.intel.com/products/88097)		2.0 GHz	3.3 GHz		800 MHz	1.0 GHz				$546	
			1258Lv4 (http://ark.intel.com/products/88096)	P5700	1.8 GHz	3.2 GHz		700 MHz			N/A		$481	

Mobile processors

Target segment	Cores (threads)	Processor branding and model		GPU model	Base frequency	Turbo frequency		TDP	cTDP down	Graphics clock rate		L3 cache	Release date	Price (USD)
						Single Core	Dual Core			Base	Max			
Performance	4 (8)	Core i7	**5950HQ (http://ark.intel.com/products/87720)**	Iris Pro 6200	2.9 GHz	3.7 GHz	N/A	47 W	N/A	300 MHz	1.15 GHz	6 MB	June 2015	$623
			5850HQ (http://ark.intel.com/products/87719)	Iris Pro 6200	2.7 GHz	3.6 GHz	N/A	47 W	N/A	300 MHz	1.1 GHz	6 MB	June 2015	$434
			5750HQ (http://ark.intel.com/products/87717)	Iris Pro 6200	2.5 GHz	3.4 GHz	N/A	47 W	600 MHz / 37 W	300 MHz	1.05 GHz	6 MB	June 2015	$434
			5700HQ (http://ark.intel.com/products/87716)	HD 5600	2.7 GHz	3.5 GHz	N/A	47 W	600 MHz / 37 W	300 MHz	1.05 GHz	6 MB	June 2015	$378
Mainstream	2 (4)		**5650U (http://ark.intel.com/products/84995)**	HD 6000	2.2 GHz	3.2 GHz	3.1 GHz	15 W	600 MHz / 9.5 W	300 MHz	1 GHz	4 MB	Q1 2015	$426
			5600U (http://ark.intel.com/products/85215)	HD 5500	2.6 GHz	3.2 GHz	3.1 GHz	15 W	600 MHz / 7.5 W	300 MHz	950 MHz	4 MB	Q1 2015	$393
			5557U (http://ark.intel.com/products/84993)	Iris 6100	3.1 GHz	3.4 GHz	3.4 GHz	28 W	N/A / 23 W	300 MHz	1.1 GHz	4 MB	Q1 2015	$426
			5550U (http://ark.intel.com/products/84992)	HD 6000	2.0 GHz	3.0 GHz	2.9 GHz	15 W	600 MHz / 9.5 W	300 MHz	1 GHz	4 MB	Q1 2015	$426
			5500U (http://ark.intel.com/products/85214)	HD 5500	2.4 GHz	3.0 GHz	2.9 GHz	15 W	600 MHz / 7.5 W	300 MHz	950 MHz	4 MB	Q1 2015	$393
		Core i5	**5350H (http://ark.intel.com/products/87713)**	Iris Pro 6200	3.1 GHz	3.5 GHz	N/A	47 W	N/A	300 MHz	1.05 GHz	4 MB	June 2015	$289
			5350U (http://ark.intel.com/products/84990)	HD 6000	1.8 GHz	2.9 GHz	2.7 GHz	15 W	600 MHz / 9.5 W	300 MHz	1 GHz	3 MB	Q1 2015	$315
			5300U (http://ark.intel.com/products/85213)	HD 5500	2.3 GHz	2.9 GHz	2.7 GHz	15 W	600 MHz / 7.5 W	300 MHz	900 MHz	3 MB	Q1 2015	$281
			5287U (http://ark.intel.com/products/84988)	Iris 6100	2.9 GHz	3.3 GHz	3.3 GHz	28 W	600 MHz / 23 W	300 MHz	1.1 GHz	3 MB	Q1 2015	$315
			5257U (http://ark.intel.com/products/84985)	Iris 6100	2.7 GHz	3.1 GHz	3.1 GHz	28 W	600 MHz / 23 W	300 MHz	1.05 GHz	3 MB	Q1 2015	$315
			5250U (http://ark.intel.com/products/84984)	HD 6000	1.6 GHz	2.7 GHz	2.5 GHz	15 W	600 MHz / 9.5 W	300 MHz	950 MHz	3 MB	Q1 2015	$315
			5200U (http://ark.intel.com/products/85212)	HD 5500	2.2 GHz	2.7 GHz	2.5 GHz	15 W	600 MHz / 7.5 W	300 MHz	900 MHz	3 MB	February 2015[31]	$281
		Core i3	**5157U (http://ark.intel.com/products/84982)**	Iris 6100	2.5 GHz	N/A	N/A	28 W	600 MHz / 23 W	300 MHz	1 GHz	3 MB	January 2015	$315
			5020U (http://ark.intel.com/products/84699)	HD 5500	2.2 GHz	N/A	N/A	15 W	600 MHz / 10 W	300 MHz	900 MHz	3 MB	March 2015	$281
			5015U (http://ark.intel.com/products/84698)	HD 5500	2.1 GHz	N/A	N/A	15 W	600 MHz / 10 W	300 MHz	850 MHz	3 MB	March 2015	$275
			5010U (http://ark.intel.com/products/84697)	HD 5500	2.1 GHz	N/A	N/A	15 W	600 MHz / 10 W	300 MHz	900 MHz	3 MB	January 2015	$281
			5005U (http://ark.intel.com/products/84695)	HD 5500	2.0 GHz	N/A	N/A	15 W	600 MHz / 10 W	300 MHz	850 MHz	3 MB	January 2015	$275
		Pentium	**3825U (http://ark.intel.com/products/86348)**	HD Graphics	1.9 GHz	N/A	N/A	15 W	600 MHz / 10 W	300 MHz	850 MHz	2 MB	March 2015	
	2 (2)		**3805U (http://ark.intel.com/products/84813)**	HD Graphics	1.9 GHz	N/A	N/A	15 W	600 MHz / 10 W	100 MHz	800 MHz	2 MB	Q1 2015	$161
		Celeron	**3755U (http://ark.intel.com/products/84811)**	HD Graphics	1.7 GHz	N/A	N/A	15 W	600 MHz / 10 W	100 MHz	800 MHz	2 MB	Q1 2015	$107
			3205U (http://ark.intel.com/products/84809)	HD Graphics	1.5 GHz	N/A	N/A	15 W	600 MHz / 10 W	100 MHz	800 MHz	2 MB	Q1 2015	$107

Target segment	Cores (Threads)	Processor Branding & Model		GPU Model	Programmable TDP[32]:69–72				CPU Turbo	Graphics Clock rate		L3 Cache	Release Date
					SDP[33][34]:71	cTDP down[a]	Nominal TDP[b]	cTDP up[c]	1-core	Normal	Turbo		
Mainstream	2 (4)[35]	Core M (vPro)	**5Y71 (http://ark.intel.com/products/84672)**	HD 5300 (GT2)[36]	3.5 W	3.5 W / 600 MHz	4.5 W / 1.2 GHz	6 W / 1.4 GHz	2.9 GHz	300 MHz	900 MHz	4 MB	October 27, 2014
			5Y70 (http://ark.intel.com/products/83612)		N/A	N/A	4.5 W / 1.1 GHz	N/A	2.6 GHz	100 MHz	850 MHz		September 5, 20
		Core M	**5Y51 (http://ark.intel.com/products/84669)**		3.5 W	3.5 W / 600 MHz		6 W / 1.3 GHz		300 MHz	900 MHz		October 27, 2014
			5Y31 (http://ark.intel.com/products/84666)				4.5 W / 900 MHz	6 W / 1.1 GHz	2.4 GHz		850 MHz		
			5Y10c (http://ark.intel.com/products/85234)				4.5 W / 800 MHz	6 W / 1 GHz	2.0 GHz		800 MHz		
			5Y10a (http://ark.intel.com/products/83611)		N/A	N/A		N/A		100 MHz			September 5, 20
			5Y10 (http://ark.intel.com/products/83610)[37]			4 W / ? MHz							

a. When a cooler or quieter mode of operation is desired, this mode specifies a lower TDP and lower guaranteed frequency versus the nominal mode.[32]:71–72
b. This is the processor's rated frequency and TDP.[32]:71–72
c. When extra cooling is available, this mode specifies a higher TDP and higher guaranteed frequency versus the nominal mode.[32]:71–72

Server processors

Target segment	Cores (threads)	Processor branding and model		GPU model	Base frequency	Turbo frequency		TDP	Socket	Memory		L3 cache	Release date	Price (USD)
						Single core	All cores			Type	Channel			
SoC server	8 (16)	Xeon D	**D-1540 (http://ark.intel.com/products/87039/Intel-Xeon-Processor-D-1540-12M-Cache-2_00-GHz)**	N/A	2 GHz	N/A	2.6 GHz	45 W	FCBGA 1667	DDR4	Dual	12 MB	Q1 2015	$581
	4 (8)		**D-1520 (http://ark.intel.com/products/87038/Intel-Xeon-Processor-D-1520-6M-Cache-2_20-GHz)**	N/A	2.2 GHz	N/A	2.6 GHz					6 MB	Q1 2015	$199

Target segment	Cores (threads)	Processor branding and model		GPU model	CPU clock rate		Graphics clock rate		L3 cache	TDP	Release date	Release price (USD) tray / box	Motherboard		
					Normal	Turbo	Normal	Turbo					Socket	Interface	M
Server	4 (8)	Xeon E3 v4	**1285v4 (http://ark.intel.com/products/88046/Intel-Xeon-Processor-E3-1285-v4-6M-Cache-3_50-GHz)**	HD (P6300)	3.5 GHz	3.8 GHz	300 MHz	1.15 GHz	6 MB	95 W	Q2 15	$556 / —	LGA 1150	DMI 2.0 PCIe 3.0	DD DD 13 wit
			1285Lv4 (http://ark.intel.com/products/88043/Intel-Xeon-Processor-E3-1285L-v4-6M-Cache-3_40-GHz)		3.4 GHz					65 W		$445 / —			
			1265Lv4 (http://ark.intel.com/products/88041/Intel-Xeon-Processor-E3-1265L-v4-6M-Cache-2_30-GHz)		2.3 GHz	3.3 GHz		1.05 GHz		35 W		$417 / —			

Target segment	Cores (threads)	Processor branding and model		CPU clock rate		L3 cache	TDP	Release date	Release price	Motherboard		
				Normal	Turbo					Socket	Interface	Memory
	22 (44)		**2699v4 (http://ark.intel.com/products/91317/Intel-Xeon-Processor-E5-2699-v4-55M-Cache-2_20-GHz)**	2.2 GHz	3.6 GHz	55 MB	145 W		$4115			
	20 (40)		**2698v4 (http://ark.intel.com/products/91753/Intel-Xeon-Processor-E5-2698-v4-50M-Cache-2_20-GHz)**	2.2 GHz	3.6 GHz	50 MB	135 W		$3226			
			2697v4 (http://ark.intel									

	18 (36)		**.com/products/91755/Intel-Xeon-Processor-E5-2697-v4-45M-Cache-2_30-GHz)**	2.3 GHz	3.6 GHz	45 MB	145 W		$2702			
	16 (32)		**2697Av4 (http://ark.intel.com/products/91768/Intel-Xeon-Processor-E5-2697A-v4-40M-Cache-2_60-GHz)**	2.6 GHz	3.6 GHz	40 MB	145 W		$2891			
	18 (36)		**2695v4 (http://ark.intel.com/products/91316/Intel-Xeon-Processor-E5-2695-v4-45M-Cache-2_10-GHz)**	2.1 GHz	3.3 GHz	45 MB	120 W		$2424			
	14 (28)		**2690v4 (http://ark.intel.com/products/91770/Intel-Xeon-Processor-E5-2690-v4-35M-Cache-2_60-GHz)**	2.6 GHz	3.5 GHz	35 MB	135 W		$2090			
	12 (24)		**2687Wv4 (http://ark.intel.com/products/91750/Intel-Xeon-Processor-E5-2687W-v4-30M-Cache-3_00-GHz)**	3.0 GHz	3.5 GHz	30 MB	160 W		$2141			
	16 (32)		**2683v4 (http://ark.intel.com/products/91766/Intel-Xeon-Processor-E5-2683-v4-40M-Cache-2_10-GHz)**	2.1 GHz	3.0 GHz	40 MB	120 W		$1745			DDR4 1600/1866/2133/2400 with ECC
	14 (28)		**2680v4 (http://ark.intel.com/products/91754/Intel-Xeon-Processor-E5-2680-v4-35M-Cache-2_40-GHz)**	2.4 GHz	3.3 GHz	35 MB	120 W		$1745			
	8 (16)		**2667v4 (http://ark.intel.com/products/92979/Intel-Xeon-Processor-E5-2667-v4-25M-Cache-3_20-GHz)**	3.2 GHz	3.6 GHz	25 MB	135 W		$2057			
	14 (28)		**2660v4 (http://ark.intel.com/products/91772/Intel-Xeon-Processor-E5-2660-v4-35M-Cache-2_00-GHz)**	2.0 GHz	3.2 GHz	35 MB	105 W		$1445			
			2658v4 (http://ark.intel.com/products/91771/Intel-Xeon-Processor-E5-2658-v4-35M-Cache-2_30-GHz)	2.3 GHz	2.8 GHz				$1832			
	12 (24)		**2650v4 (http://ark.intel.com/products/91767/Intel-Xeon-Processor-E5-2650-v4-30M-Cache-2_20-GHz)**	2.2 GHz	2.9 GHz	30 MB	105 W		$1166 - $1171			
Server (dual socket)	14 (28)		**2650Lv4 (http://ark.intel.com/products/91752/Intel-Xeon-Processor-E5-2650L-v4-35M-Cache-1_70-GHz)**	1.7 GHz	2.5 GHz	35 MB	65 W	Q1 16	$1329			
			2648Lv4 (http://ark.intel.com/products/91759/Intel-Xeon-Processor-E5-2648L-v4-35M-Cache-1_80-GHz)	1.8 GHz	2.5 GHz		75 W		$1544			
	6 (12)	Xeon E5 v4	**2643v4 (http://ark.intel.com/products/92989/Intel-Xeon-Processor-E5-2643-v4-20M-Cache-3_40-GHz)**	3.4 GHz	3.7 GHz	20 MB	135 W		$1552	LGA 2011-3	PCIe 3.0	

	10 (20)		**2640v4 (http://ark.intel.com/products/92984/Intel-Xeon-Processor-E5-2640-v4-25M-Cache-2_40-GHz)**	2.4 GHz	3.4 GHz	25 MB	90 W		$939		DDR4 1600/1866/2133 with ECC
	4 (8)		**2637v4 (http://ark.intel.com/products/92983/Intel-Xeon-Processor-E5-2637-v4-15M-Cache-3_50-GHz)**	3.5 GHz	3.7 GHz	15 MB	135 W		$996		DDR4 1600/1866/2133/2400 with ECC
	10 (20)		**2630v4 (http://ark.intel.com/products/92981/Intel-Xeon-Processor-E5-2630-v4-25M-Cache-2_20-GHz)**	2.2 GHz	3.1 GHz	25 MB	85 W		$667		DDR4 1600/1866/2133 with ECC
			2630Lv4 (http://ark.intel.com/products/92978/Intel-Xeon-Processor-E5-2630L-v4-25M-Cache-1_80-GHz)	1.8 GHz	2.9 GHz		55 W		$612		
	12 (24)		**2628Lv4 (http://ark.intel.com/products/91775/Intel-Xeon-Processor-E5-2628L-v4-30M-Cache-1_90-GHz)**	1.9 GHz	2.4 GHz	30 MB	75 W		$1364		
	4 (8)		**2623v4 (http://ark.intel.com/products/92986/Intel-Xeon-Processor-E5-2623-v4-20M-Cache-2_10-GHz)**	2.6 GHz	3.2 GHz	10 MB	85 W		$444		
	8 (16)		**2620v4 (http://ark.intel.com/products/92986/Intel-Xeon-Processor-E5-2620-v4-20M-Cache-2_10-GHz)**	2.1 GHz	3.0 GHz	20 MB			$417		
	10 (20)		**2618Lv4 (http://ark.intel.com/products/92982/Intel-Xeon-Processor-E5-2618L-v4-25M-Cache-2_20-GHz)**	2.2 GHz	3.2 GHz	25 MB	75 W		$779		
	8 (8)		**2609v4 (http://ark.intel.com/products/92990/Intel-Xeon-Processor-E5-2609-v4-20M-Cache-1_70-GHz)**	1.7 GHz	1.7 GHz	20 MB	85 W		$306 - $310		DDR4 1600/1866 with ECC
	8 (16)		**2608Lv4 (http://ark.intel.com/products/92988/Intel-Xeon-Processor-E5-2608L-v4-20M-Cache-1_60-GHz)**	1.6 GHz	1.7 GHz		50 W		$363		
	6 (6)		**2603v4 (http://ark.intel.com/products/92993/Intel-Xeon-Processor-E5-2603-v4-15M-Cache-1_70-GHz)**	1.7 GHz	1.7 GHz	15 MB	85 W		$213		
Server (single	8 (16)		**1680v4 (http://ark.intel.com/products/92992/Intel-Xeon-Processor-E5-1680-v4-20M-Cache-3_40-GHz)**	3.4 GHz	4.0 GHz	20 MB	140 W	Q2 16	$1723		DDR4 1600/1866/2133/2400 with ECC
			1660v4 (http://ark.intel.com/products/92985/Intel-Xeon-Processor-E5-1660-v4-20M-Cache-3_20-GHz)	3.2 GHz	3.8 GHz				$1113		
	6 (12)		**1650v4 (http://ark.intel.com/products/92994/Intel-Xeon-Processor-E5-1650-v4-15M-Cache-**	3.6 GHz	4.0 GHz	15 MB			$617 - $621		

socket)			**5-1650-v4-15M-Cache-3_60-GHz)**								with ECC
	4 (8)		**1630v4 (http://ark.intel.com/products/92987/Intel-Xeon-Processor-E5-1630-v4-10M-Cache-3_70-GHz)**	3.7 GHz	4.0 GHz	10 MB			$406		
			1620v4 (http://ark.intel.com/products/92991/Intel-Xeon-Processor-E5-1620-v4-10M-Cache-3_50-GHz)	3.5 GHz	3.8 GHz				$294 - $297		

Roadmap and history

On September 10, 2013, Intel showcased the Broadwell 14 nm processor in a demonstration at IDF. Intel CEO Brian Krzanich claimed that the chip would allow systems to provide a 30 percent improvement in power use over the Haswell chips released in mid-2013. Krzanich also claimed that the chips would ship by the end of 2013;[38] however, the shipment was delayed due to low yields from Intel's 14 nm process.[39]

On October 21, 2013, a leaked Intel roadmap indicated a late 2014 or early 2015 release of the K-series Broadwell on the LGA 1150 platform, in parallel with the previously announced Haswell refresh. This will coincide with the release of Intel's 9-series chipset, which may be required for Broadwell processors due to a change in power specifications for its LGA 1150 socket.[40][41]

On May 18, 2014, *Reuters* quoted Intel's CEO promising that Broadwell-based PCs will be on shelves for the holiday season, but probably not for the back-to-school shopping.[42]

Mobile CPUs are expected in Q4 2014 and high-performance quad-core CPUs in 2015. The mobile CPUs will benefit from the reduced energy consumption of the die shrink.[43][44]

On June 18, 2014, Intel told *CNET* that while some specialized Broadwell-based products would be out in Q4 2014, "broader availability" (including mobile CPUs) would only happen in 2015.[45]

As of July 2014, Broadwell CPUs are available to Intel's hardware partners in sample quantities.[46] Intel is expected to release 17 Broadwell U series family microprocessors at CES 2015.[47] Also, according to a leak posted on vr-zone, Broadwell-E chips will be available in 2016.[48]

On August 11, 2014, Intel unveiled formally its 14 nm manufacturing process, which is used for Broadwell, and indicated that mobile variants of the process will be known as *Core M* products. Additionally, Core M products were announced to be shipping during the end of 2014, with desktop variants shipping shortly after.[49]

With Broadwell, Intel focused mainly on laptops, miniature desktops, and all-in-one systems.[50] This left traditional desktop users with no new socketed CPU options beyond fourth-generation Haswell, which first arrived in 2013. Even though the company finally introduced two Broadwell desktop chips in the summer of 2015, it launched its high-end sixth-generation Skylake CPUs very shortly thereafter. In September 2015, Kirk Skaugen, senior vice president and general manager of Intel's Client Computing Group, admitted that skipping desktops with Broadwell was a poor decision. Between the end-of-life for Windows XP in 2014 and the lack of new desktop chips, Intel has not given desktop PC users any good reasons to upgrade in 2015.[50]

Releases

On September 5, 2014, Intel launched the first three Broadwell-based processors that belong to the low-TDP Core M family, Core M 5Y10, Core M 5Y10a and Core M 5Y70.[51]

On October 9, 2014, the first laptop with Broadwell Intel Core M 5Y70 CPU, Lenovo Yoga 3 Pro, was launched.[52]

On October 31, 2014, four more Broadwell based CPUs were launched belonging to Core M Family, increasing the number of launched Broadwell CPUs to seven.[53]

On January 5, 2015, 17 additional Broadwell laptop CPUs were launched for the Celeron, Pentium and Core i3, i5 and i7 series.[54]

On March 31, 2016, Intel officially launched 14 nm Broadwell-EP Xeon E5 V4 CPUs.[55]

On May 30, 2016, Intel officially launched 14 nm Broadwell-E Core i7 69xx/68xx processor family.

See also

- List of Intel CPU microarchitectures
- List of Intel Core M microprocessors

Notes

a. Implemented as eDRAM and serving primarily to increase the performance of integrated GPU, while being shared with the CPU.

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External links

- Intel to launch Broadwell "U" series CPUs at CES 2015 (http://www.cpu-world.com/news_2014/2014100301_Intel_to_launch_Broadwell_U_series_CPUs_at_CES_event.html)

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