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German subcompact executive/small family car Motor vehicle Audi A3Audi A3 Saloon (4th generation)OverviewManufacturerAudi AGProduction1996–presentBody and chassisClass Small family car (1996-2012) Subcompact executive car (2013-present) (C) Body style3 or 5-door hatchback4-door saloonLayoutFront-engine, front-wheel-drive/all-wheel-drive (quattro) The Audi A3 is a subcompact executive/small family car (C-segment) manufactured and marketed by the German automaker Audi AG since 1996,[1][2] currently in its fourth generation. The first two generations of the Audi A3 were based on the Volkswagen Group A platform, while the third-generation and fourth-generation A3 uses the Volkswagen Group MQB platform. First generation (Typ 8L; 1996) Motor vehicle First generation (8L)Audi A3 5-door (post-facelift)OverviewProduction1996–2003AssemblyGermany: Ingolstadt (1996-May 2003)Brazil: Curitiba (Volkswagen do Brasil, 2000–2006)DesignerDirk van Braeckel (1992)[3][4]Body and chassisBody style3-door hatchback5-door hatchbackPlatformVolkswagen Group A4 (PQ34)RelatedVolkswagen Golf Mk4SEAT León Mk1PowertrainEnginePetrol engine Inline-four 1.6 L1.8 L 20v1.8 L 20v Turbo Diesel engine Inline-four 1.9 L TDI Transmission Manual transmission 5-speed Manual6-speed Manual Automatic transmission 4-speed Automatic5-speed Automatic DimensionsWheelbaseA3 2,513 mm (98.9 in)quattro & S3: 2,519 mm (99.2 in)LengthA3 4,152 mm (163.5 in)S3 4,159 mm (163.7 in)WidthA3 1,735 mm (68.3 in)S3 1,763 mm (69.4 in)HeightA3 1,423 mm (56.0 in)S3 1,415 mm (55.7 in) The original A3 (or Typ 8L) was announced back in June 1995, but introduced first in the European market for more than year in September 1996, marking Audi's return to the production of smaller cars following the demise of the Audi 50 in 1978. This was the first Volkswagen Group model to use the "PQ34" or "A4" platform, bearing a close resemblance to the contemporary Volkswagen Golf Mk4, which arrived a year later. Within three years, this platform was used for total of seven cars. The A3 was initially available only with a three-door hatchback body, to present a more sporty image than the Golf, in both front and four-wheel drive. The inline four-cylinder engines were transversely mounted. The Audi A3 was the eighth model in the Audi lineup to use five valves per cylinder. The United Kingdom market first received the Audi A3 in November 1996. In 1999 Audi expanded the range with the introduction of more powerful versions: a 1.8 turbo rated 180 PS (132 kW; 178 hp), and a 1.9 TDI diesel engine with unit injector "Pumpe Düse" (PD) technology and variable geometry turbocharger. The four-wheel-drive A3 1.8T quattro used either the 150 PS (110 kW; 148 hp) or 180 PS (132 kW; 178 hp) engine, and the same Haldex Traction-based four-wheel-drive system as the Audi S3 and the Audi TT. Also in 1999, Audi also introduced a five-door body. In late 2000 the A3 range was revised with new headlights and rear lamps, other minor cosmetic changes, an improved interior, and the introduction of a six-speed manual gearbox, on the 180 PS (132 kW; 178 hp) 1.8 Turbo and the new 130 PS (96 kW; 128 hp) 1.9 TDI. Audi's electronic stability control, traction-control, and brake force distribution computer became standard equipment in some countries. Although the first-generation Audi A3 was replaced in Europe in 2003, the first generation model continued to be sold in some markets. Production of the first generation model stopped in Brazil in 2006. Audi A3 3-door (pre-facelift) Audi A3 5-door (pre-facelift) Audi S3 5-door (post-facelift) Safety Euro NCAP test results Audi A3, 3dr hatchback (1998)[5] Test Score Rating Adult occupant: 25 Pedestrian: 12 Euro NCAP rating of 4 out of 5 stars.[5] Their evaluation concluded "the column lock, adjuster lever and bracket presented hazards in the knee impact area for the driver. These could cause high loads on his upper legs and damage to his knees." The A3 also provides almost no protection to pedestrians, giving it two stars out of a possible four.[5] S3 (1999–2003) Audi S3 (pre-facelift) Audi S3 (facelift) finished in Imola Yellow Audi S3 (pre-facelift) Audi released the A3-derived Audi S3 in 1999, only as a three-door hatchback. The inline-four 20v 1.8 L turbocharged petrol engine came in two versions: 210 PS (154 kW; 207 bhp) and 225 PS (165 kW; 222 bhp). Early models (1999–2001) had 210 PS (154 kW; 207 hp). Later models (2001–2003) had variable valve timing and 225 PS (165 kW; 222 hp). The engine had a maximum of 280 N·m (210 ft·lbf) torque. This was the first time a small four-cylinder engine had been used in an Audi S-series car. Although dubbed "quattro", the S3 uses a different four-wheel drive system.[6] The Haldex Traction coupling adjusts the bias of torque distribution from the front to rear axle as grip requirements change – most of the time it operates as a front-wheel drive. The S3 was sold in Europe, Japan, Mexico, South Africa, Australia, and New Zealand. The S3 was given a facelift in 2002, where it was given one-piece headlights/indicator units, different front wings, rear lights clusters, and some minor upgrades to interior trim. Standard features include xenon HID headlamps with high pressure washers and auto levelers, front fog lamps, 17" "Avus" alloy wheels with 225/45R17 tyres, electrically adjustable Recaro leather seats, climate control, alarm and electronic stability control with traction control. Options include a Bose sound system, boot/trunk or in-dash mounted 6-disc CD changer, metallic paint, 18-inch 9-spoke RSTT wheels, glass sunroof, centre arm rest, privacy glass (B-pillar backwards), auto-dimming rear-view mirror, parking assist, luggage net, heated front seats, cruise control, aluminium door mirror casings and part leather/Alcantara (blue/silver/yellow) combination seat coverings. These items are standard in some export markets. Engines The engines used are the same as those for many other cars in the Volkswagen Group. Name Type Engine code Output at rpm Torque at rpm 0–100 km/h (0–62 mph) time Top speed Years Petrol engines[7] 1.6 8v 1,595 cc (97 cu in) I4 AEH/AKL/APF 101 PS (74 kW; 100 hp) at 5,600 rpm 145 N·m (107 lbf·ft) at 3,800 rpm 11.0 s 188 km/h (117 mph) 1996–2000 1.6 8v 1,595 cc (97 cu in) I4 AVU/BFQ 102 PS (75 kW; 101 hp) at 5,600 rpm 148 N·m (109 lbf·ft) at 3,800 rpm 10.9 s 189 km/h (117 mph) 2000–2003 1.8 20v 1,781 cc (109 cu in) I4 AGN/APG 125 PS (92 kW; 123 hp) at 6,000 rpm 170 N·m (125 lbf·ft) at 4,200 rpm 9.6 s 202 km/h (126 mph) 1996–2003 1.8 20vT 1,781 cc (109 cu in) I4 turbo AGU/ARZ/ARX/AUM 150 PS (110 kW; 148 hp) at 5,700 rpm 210 N·m (155 lbf·ft) at 1,750–4,600 rpm 8.2 s 217 km/h (135 mph) 1996–2003 1.8 20vT 1,781 cc (109 cu in) I4 turbo AJQ/APP/ARY/AUQ 180 PS (132 kW; 178 hp) at 5,500 rpm 235 N·m (173 lbf·ft) at 1,950–5,000 rpm 7.5 s 228 km/h (142 mph) 1999–2003 1.8 20vT (S3) 1,781 cc (109 cu in) I4 turbo APY, AMK 210 PS (154 kW; 207 hp) at 5,800 rpm 270 N·m (199 lbf·ft) at 2,100 rpm 6.8 s 238 km/h (148 mph) 1999–2001 1.8 20vT (S3) 1,781 cc (109 cu in) I4 turbo BAM 225 PS (165 kW; 222 hp) at 5,900 rpm 280 N·m (207 lbf·ft) at 2,200 rpm 6.6 s 243 km/h (151 mph) 2001–2003 Diesel engines[7] 1.9 8v TDI 1,896 cc (116 cu in) I4 turbo AGR/ALH 90 PS (66 kW; 89 hp) at 4,000 rpm 210 N·m (155 lbf·ft) at 1,900 rpm 12.4 s 181 km/h (112 mph) 1996–2001 1.9 8v TDI 1,896 cc (116 cu in) I4 turbo ATD/AXR 100 PS (74 kW; 99 hp) at 4,000 rpm 240 N·m (177 lbf·ft) at 1,800–2,400 rpm 11.0 s 188 km/h (117 mph) 2001–2003 1.9 8v TDI 1,896 cc (116 cu in) I4 turbo AHF/ASV 110 PS (81 kW; 108 hp) at 4,150 rpm 235 N·m (173 lbf·ft) at 1,900 rpm 10.5 s 194 km/h (121 mph) 1997–2000 1.9 8v TDI 1,896 cc (116 cu in) I4 turbo ASZ 130 PS (96 kW; 128 hp) at 4,000 rpm 310 N·m (229 lbf·ft) at 1,900 rpm 9.2 s 205 km/h (127 mph) 2000–2003 Second generation (Typ 8P; 2003) Motor vehicle Second generation (8P)2005–2008 Audi A3 SportbackOverviewProduction2003–2013AssemblyGermany: Ingolstadt[8]Belgium: Brussels (2004–2005; 2007–May 2010)Hungary: GyőrBrazil: Curitiba (Volkswagen do Brasil, CKD; 12/2012–03/2013)DesignerGary Telaak[9][10] (2000)Body and chassisBody style3-door hatchback5-door Sportback (hatchback)2-door convertiblePlatformVolkswagen Group A5 (PQ35)RelatedVolkswagen Golf Mk5SEAT León Mk2Volkswagen Gran LavidaPowertrainEngine Inline-four petrol engine 1.2 L I4 Turbo FSI (TFSI)1.4 L I4 Turbo FSI (TFSI)1.6 L I4 FSI1.8 L I4 TFSI2.0 L I4 FSI2.0 L I4 TFSI Straight-five petrol engine 2.5 L I5 TFSI VR6 engine 3.2 L VR6 (petrol) Inline-four diesel engine 1.6 L I4 TDI1.9 L I4 TDI2.0 L I4 TDI Transmission Manual transmission 5-speed manual6-speed manual Automatic transmission 6-speed automatic Dual-clutch automatic transmission 6-speed S-Tronic7-speed S-Tronic DimensionsWheelbase2,578 mm (101.5 in)Length3-door: 4,215 mm (165.9 in)5-door: 4,285 mm (168.7 in)Width1,765 mm (69.5 in)Height1,420 mm (55.9 in) At the 2003 Geneva Motor Show, Audi launched the second generation of the A3, the Typ 8P, designed by Gary Telaak during 2000 (however, the final design was frozen in 2001). Originally launched only as a three-door hatchback with four-cylinder engines, it featured a new automobile platform (the PQ35 platform), a redesigned and more spacious interior, new petrol engines with Fuel Stratified Injection (FSI), and standard six-speed manual gearboxes (except on the base 1.6). In mid-2003 the line was updated with two sports-oriented models, a 2.0 Turbo-FSI version rated 200 PS (147 kW; 197 hp), and a 3.2 L VR6 engine (for the first time) with 250 PS (184 kW; 247 hp). Haldex Traction-based quattro on-demand four-wheel drive, and the S-Tronic semi-auto gearbox were introduced as options (quattro is standard on the VR6) on models with engines over 140 PS (103 kW; 138 hp). In 2005 the "S line" trim level, offering new decorative elements, became available and the three-door A3 received the same front-end styling features as the Sportback model. For the first time, the A3 became available in the North American market, exclusively with the Sportback body, with the base 2.0 inline-four FSI introduced in 2005 as a 2006 model, and the 3.2 VR6 Quattro following. Chassis codes 8P1 8PA 8P7 Body type 3-door hatchback 5-door Sportback Cabriolet Years 2003– 2004– 2008– A3 Sportback (2004–2013) The five-door "Sportback" model was introduced in June 2004. The A3 Sportback is 80 mm (3.1 in) longer than the base three-door body, and includes improved rear cabin space and a larger luggage compartment (370 litres). It also received the new "single frame" front grille originally introduced in the A8 W12, which was later adopted across the whole A3 range. S3 (2006–2013) Audi S3 3 door hatchback Audi S3 Sportback In August 2006, Audi introduced the second generation S3. Offered in three- and five-door body styles, the second generation—Typ 8P—S3 is powered by a modified and uprated Volkswagen Group-sourced 2.0-litre turbocharged FSI petrol engine, with a maximum output of 195 kW (265 PS; 261 bhp). As with all Audi S models, the design was done in-house by quattro GmbH. The engine features uprated high-performance pistons, revised boost/fuel mapping, increased turbocharger size (KKK K04) and larger intercooler. The most powerful form of this engine, and quattro four-wheel drive, makes for a 0–100 km/h (0–62 mph) time of 5.5 seconds, and an electronically limited top speed of 250 km/h (155 mph). Audi offers both six-speed manual and six-speed S-Tronic automatic transmissions with the S3. The spring ratings and dampers were revised, along with the body kit. Like its predecessor, although badged a "Quattro" model, the S3 does not employ a Torsen centre differential (as in other common Quattro models), but instead uses the Swedish Haldex Traction system in its on-demand four-wheel drive transmission, due to the transverse engine layout. Safety Euro NCAP test results Audi A3, RHD 3-dr hatchback (2003)[11] Test Score Rating Adult occupant: 29 Child occupant: 35 Pedestrian: 8 Euro NCAP tested a second-generation Audi A3 with front airbags, side airbags, seatbelt pretensioners, and load limiters as standard. Despite Audi increasing the protection inside the car for the driver and passengers, pedestrian safety actually got 33% worse compared to the first generation and Euro NCAP gave criticism for the car offering virtually no protection at all on the front end and scoring just one star from a possible four. "A poor result for a new car" was the verdict given for pedestrian safety after the test. 2003–2005 Audi A3 3-door 2005–2008 Audi A3 3-door 2005–2008 Audi A3 3-door 2005–2008 Audi A3 Sportback 2008 facelift Audi introduced a number of changes to the A3 and S3 in 2008. These include revised nose and tail styling, with a modified grille and daytime running lights, common rail 2.0 TDI engines, seven-speed S tronic dual clutch transmission availability for the smaller non-U.S. engines, and optional "magnetic ride" adaptive shock absorbers. In addition, the range now includes an S3 Sportback model.[12] Also, a cabriolet version was introduced. It was similar in dimensions to the 3-door version, with a two-box design. 2008–2010 Audi A3 Sportback 2008–2010 Audi A3 Sportback 2008–2010 Audi A3 3-door 2008–2010 Audi A3 cabriolet 2010–2013 Audi A3 Sportback 2010–2013 Audi A3 Sportback 2010–2012 Audi A3 cabriolet 2010 Audi S3 Sportback 2010 Audi S3 Sportback Interior Audi A3 TDI Clubsport quattro is a concept car unveiled in 2008. Based on the Audi A3 three-door, it is an approach by Audi to address both performance and the environment. The engine in the concept car is a turbocharged 2.0-litre diesel producing 224 hp (167 kW) and 332 lb·ft (450 N·m) of torque. It produces 13.8 horsepower (84.9 kW) per litre while meeting Euro 5 Diesel emission standards. It uses the quattro drive system with a six-speed manual transmission. The chassis has Audi's Magnetic Ride Suspension system, lowering the vehicle 1.4 inches (36 mm) from the base model. It also has ceramic front brakes, a four-link rear suspension and electro-mechanical servo assist for the rack and pinion steering.[13] Exterior modifications include the widening of the three-door's grill, modifying the odd, and enlarging air intakes. Bolt-on fender flares and a large rear spoiler have been added. The interior changes include sport seats and a flat-bottomed steering wheel.[13] Audi claims performance of 0 to 62 mph (0 to 100 km/h) in 6.6 seconds with a top speed of 149 mph (240 km/h).[14] It is expected to get approximately 40 miles per US gallon (5.9 L/100 km; 48 mpg‑imp).[15] RS 3 Sportback (2011–2012) Audi RS 3 Sportback The Audi RS 3 is derivative of the A3 Sportback with a 5-cylinder, 2,480 cc (151 cu in) turbocharged engine rated at 340 PS (250 kW; 335 hp) and 450 N·m (332 lbf·ft), vermicular-graphite cast iron crankcase, seven-speed S tronic transmission with two automatic modes and one manual mode, Quattro on-demand four-wheel drive system, widened track to 1,564 mm (61.57 in), MacPherson strut in aluminum, lowered body by 25 mm (0.98 in), 19-inch cast aluminum wheels in machine-polished titanium styling (optional black with a red rim flange) with 235/35 front and 225/35 rear tires, 370 mm (14.57 in) front and 310 mm (12.20 in) ventilated brake discs, aluminum brake disk covers, four-piston fixed calipers in high-gloss black with RS logos, electronic stabilization program with Sport mode, flared front fenders made of carbon-fiber-reinforced plastic (CFRP), prominent sill panels and exterior mirror casings in matte aluminum, roof spoiler, high-gloss black diffuser insert, two elliptical exhaust tailpipes on the left, black interior, sports seats upholstered in Nappa leather with silver contrasting stitching, inlays in Piano black finish or Aluminum Race colour, flat-bottomed leather multifunction sports steering wheel, choice of 5 body colors are available with an unlimited selection of custom paint finishes. Its acceleration is quoted as 0 to 62 mph (0 to 100 km/h) in 4.6 seconds, with an electronically limited top speed of 155 mph (249 km/h). Optional features included front bucket seats, roof rails in matte aluminum look, styling packages in black or matte aluminum.[16] First deliveries started in early 2011.[17] A3 Cabriolet Sport and S line Final Edition (2013–) The A3 Cabriolet Sport Final Edition is a version of the A3 Cabriolet Sport for the UK market, commemorating the end of the A3 Cabriolet's production run. It included Vienna leather upholstery, front seat heating, rear parking sensors, automatic headlight and wiper activation, cruise control, a Bluetooth mobile phone interface. S line Final Edition is based on the A3 Cabriolet Sport Final Edition model, with 18-inch 5 line alloy wheel with a new five-segment spoke design, full Vienna leather upholstery, S line safety and entertainment features with xenon plus headlights with LED daytime running lamps, DVD-based satellite-navigation, Audi Music Interface iPod connection, a BOSE sound system.[18] Engines In January 2007, the naturally-aspirated 2.0 FSI was replaced by a new turbocharged 1.8 TFSI engine rated 160 PS (118 kW; 158 hp). It is available in front-wheel drive only. In late 2007, Audi introduced a new 125 PS (92 kW; 123 hp) 1.4 TFSI engine for the A3, replacing the 1.6 L FSI engine, and a new diesel "e"-model. The "e"-model, Audi's equivalent of Volkswagen's BlueMotion, is available with the 1.9 L TDI engine, and offers a more ecological car, with a CO2 emission below 120 g/km. Audi released two models of the A3 1.6 TDI for the European market. The first uses Audi's start/stop and energy recovery system, and produces 105 PS (77 kW; 104 bhp). This engine achieves approximately 4.1 L/100 km (69 mpg‑imp; 57 mpg‑US).[clarification needed] The second engine does not use the same efficiency systems and will produce 90 PS (66 kW; 89 hp) will get 4.5 L/100 km (63 mpg‑imp; 52 mpg‑US). They went on sale in June 2009.[19] In 2009, the 1.6 L eight-valve petrol engine was replaced by a turbocharged 1.2 TFSI engine already found in VW's Polo and Golf models. This engine is rated at 105 PS (77 kW; 104 hp) and 175 N·m (129 lbf·ft), emitting 127 g/km of CO2.[20] As of April 2010, Audi has yet to release official specifications or prices for the 1.2 TFSI model, as the 1.6 model has been made a special clearance model for clearing out 1.6 stock.[citation needed] The A3 2.0 TDI clean diesel is a version of Audi's A3 2.0 TDI for the North American market, making it the second Audi TDI vehicle sold in North America, following the Audi Q7 TDI in 2008. It is a FWD vehicle with S-Tronic transmission with Hill-hold assist, Sirius satellite radio, Leather seats and steering wheel, Auxiliary audio input, Dual-zone climate control, 17-inch (430 mm) alloy wheels. The vehicle was unveiled at the 2009 North American International Auto Show. This US model would begin sale in the first quarter of 2010 as a 2010 model year vehicle.[21] In March 2011, the line-up was expanded with the introduction of a more powerful 2.0 TDI with 170 PS (125 kW; 168 hp). The 2.0 TDI engine was included in the engines found by the United States Environmental Protection Agency to use software intentionally designed to turn off emission control systems except when undergoing emission testing.[22] Models made from 2009 to 2015 were affected. Petrol engines Model Engine displacement Engine code Power at rpm Torque at rpm 0–100 km/h (0–62 mph)time Years 1.2 TFSI 1,197 cc (73 cu in) I4 CBZB 105 PS (77 kW; 104 hp) at 5,000 rpm 175 N·m (129 lbf·ft) at 1,550–4,100 rpm 10.6 s 2010–2013 1.4 TFSI 1,390 cc (85 cu in) I4 CAXC 125 PS (92 kW; 123 hp) at 5,000 rpm 200 N·m (148 lbf·ft) at 1,500–4,000 rpm 9.1 s 2007–2013 1.6 1,595 cc (97 cu in) I4 BGU / BSE / BSF / CCS 102 PS (75 kW; 101 hp) at 5,600 rpm 148 N·m (109 lbf·ft) at 3,800 rpm 11.5 s 2003–2010 1.6 FSI 1,598 cc (98 cu in) I4 BAG / BLF / BLP 115 PS (85 kW; 113 hp) at 6,000 rpm 155 N·m (114 lbf·ft) at 4,000 rpm 10.6 s 2003–2007 1.8 TFSI 1,798 cc (110 cu in) I4 BYT / BZB 160 PS (118 kW; 158 hp) at 5,000–6,200 rpm 250 N·m (184 lbf·ft) at 1,500–4,200 rpm 7.7 s 2007–2008 CDAA 160 PS (118 kW; 158 hp) at 4,500–6,200 rpm 250 N·m (184 lbf·ft) at 1,500–4,500 rpm 7.4 s 2009–2013 2.0 FSI 1,984 cc (121 cu in) I4 AXW / BLR / BLX / BLYBVY / BVX / BVZ 150 PS (110 kW; 148 hp) at 6,000 rpm 200 N·m (148 lbf·ft) at 3,250–4,250 rpm 8.8 2003–2008 2.0 TFSI AXX / BPY / BWA / CAWB 200 PS (147 kW; 197 hp) at 5,100–6,000 rpm 280 N·m (207 lbf·ft) at 1,700–5,000 rpm 6.8 s 2004–2008 CCZA 200 PS (147 kW; 197 hp) 280 N·m (207 lbf·ft) at 1,700–5,000 rpm 6.8 s 2009–2013 BHZ / CDLA 265 PS (195 kW; 261 hp) at 6,000 rpm 350 N·m (258 lbf·ft) at 2,500–5,000 rpm 5.6 s 2006–2013(Audi S3 only) 2.5 TFSI 2,480 cc (151 cu in) I5 CEPA 340 PS (250 kW; 335 hp) at 5,400–6,500 rpm 450 N·m (332 lbf·ft) at 1,600–5,300 rpm 4.6 s 2011–2013 (Audi RS 3 only) 3.2 3,189 cc (195 cu in) VR6 BDB / BMJ / BUB 250 PS (184 kW; 247 hp) at 6,300 rpm 320 N·m (236 lbf·ft) at 2,500–3,000 rpm 6.3 s 2003–2009 Diesel engines Model Engine displacement Engine code Power at rpm Torque at rpm 0–100 km/h (0–62 mph)time Years 1.6 TDI 1,598 cc (98 cu in) I4 CAYB 90 PS (66 kW; 89 hp) at 4,200 rpm 230 N·m (170 lbf·ft) at 1,500–2500 11.4 s 2009–2013 CAYC 105 PS (77 kW; 104 hp) at 4,400 rpm 250 N·m (184 lbf·ft) at 1500–2500 11.0 s 2009–2013 1.9 TDI 1,896 cc (116 cu in) I4 BJB / BKC / BXE / BLS 105 PS (77 kW; 104 hp) at 4,000 rpm 250 N·m (184 lbf·ft) at 1,900 rpm 11.0 s 2003–2009 2.0 TDI 1,968 cc (120 cu in) I4 BKD 140 PS (103 kW; 138 hp) at 4,000 rpm 320 N·m (236 lbf·ft) at 1,750–2,500 rpm 9.2 s 2003–2008 BMM 140 PS (103 kW; 138 hp) at 4,000 rpm 320 N·m (236 lbf·ft) at 1,750–2,500 rpm 9.2 s 2006–2008 BMN 170 PS (125 kW; 168 hp) at 4,200 rpm 350 N·m (258 lbf·ft) at 1,750–2,500 rpm 7.9 s 2006–2008 CBAB 140 PS (103 kW; 138 hp) at 4,200 rpm 320 N·m (236 lbf·ft) at 1,750–2,500 rpm 9.3 s 2008–2013 CBBB 170 PS (125 kW; 168 hp) at 4,200 rpm 350 N·m (258 lbf·ft) at 1,750–2,500 rpm 7.8 s (S-Tronic)[24] 8.2 s (Manual)[24] 2008–2013 CBEA 140 PS (103 kW; 138 hp) at 4,200 rpm[25] 320 N·m (236 lbf·ft) at 1,750–2,500 rpm 9.6 s 2010–2013 Third generation (Typ 8V; 2012) Motor vehicle Third generation (8V)Audi A3 Sportback (pre-facelift)OverviewProduction2012–2020October 2013–2020 (Convertible)AssemblyGermany: IngolstadtHungary: GyőrChina: Foshan (FAW-Volkswagen)India: Aurangabad (Audi India)Brazil: São José dos Pinhais[26]Algeria: Relizane[27]DesignerDany Garand[28] (2009) Markus Gleitz (Sedan: 2010)Body and chassisBody style3-door hatchback4-door sedan5-door hatchbackPlatformVolkswagen Group MQB platformRelatedVolkswagen Golf Mk7[29]SEAT León Mk3[29]Škoda Octavia Mk3[29]PowertrainEngine Inline-three petrol engine 1.0 L I3 TFSi Inline-four petrol engine 1.2 L I4 TFSI1.4 L I4 TFSI1.4 L I4 TFSI ACDT1.4 L I4 TFSi ACDT PHEV System1.8 L I4 TFSi2.0 L I4 TFSi Inline-four Bi-Fuel (Petrol/CNG) engine 1.4 L TGi I4 ACDT (A3 g-tron) Straight-five engine 2.5 L I5 TFSi Inline-four diesel engine 1.6 L I4 TDi2.0 L I4 TDi Transmission6-speed manual6-speed S-Tronic) automatic7-speed (S-Tronic) automaticDimensionsWheelbase2-door convertible: 2,595 mm (102.2 in)[30]3-door: 2,601 mm (102.4 in)4-door: 2,636 mm (103.8 in)5-door: 2,636 mm (103.8 in)[31]Length2-door convertible: 4,423 mm (174.1 in)[30]3-door: 4,237 mm (166.8 in)4-door: 4,456 mm (175.4 in)5-door: 4,310 mm (169.7 in)[31]Width2-door convertible: 1,793 mm (70.6 in)[30]3-door: 1,777 mm (70.0 in)4-door: 1,796 mm (70.7 in)5-door: 1,785 mm (70.3 in)[31]Height2-door convertible: 1,409 mm (55.5 in)[30]3-door: 1,421 mm (55.9 in)4-door: 1,416 mm (55.7 in)5-door: 1,421 mm (55.9 in)[31]Kerb weight1,150–1,520 kg(2,535–3,351 lb)[32][33] Audi A3 S line hatchback finished in Porsche's Viper Green The vehicle was unveiled at the 2012 Geneva Motor Show[34][failed verification][35] and went on sale in the second quarter of 2012.[35] First vehicle using the flexible modular Volkswagen Group MQB platform, the third generation is available as a three-door hatchback, a five-door "Sportback", a four-door saloon to directly rival the Mercedes-Benz CLA-Class, and a two-door Cabriolet. The front suspension is a MacPherson strut set-up while the rear utilizes torsion bar suspension (models with less than 150 PS) or multi-link rear suspension (models with 150 PS or more).[36] The features include: Multi-collision brake: Emergency braking function stops the car after the first impact, to prevent secondary collisions[37] Multi Media Interface MMI entertainment system (Tegra 2 processor) with handwriting recognition 4G broadband internet adaptive cruise control Pre sense front/basic radar-guided collision avoidance system active lane assist side assist Early German models include 1.4 TFSI (122 PS), 1.8 TFSI (180 PS), and 2.0 TDI (150 PS).[38][failed verification] 1.2 TFSI (105 PS), 1.4 TFSI (140 PS), 1.8 TFSI quattro (180 PS), and 2.0 TDI quattro (150 PS) were added in 2013.[39][failed verification] A3 1.2 TFSI (105 PS) was added to the UK market in 2013,[40] followed by A3 1.4 TFSI (140 PS) in 2013.[41] For the 2020 model year, the vehicle is exclusively built at the Ingolstadt plant, as opposed to previous model years where sedans and convertibles were built at the Győr plant.[42] A3 Sedan (2013–present) Audi A3 sedan (pre-facelift) The A3 Sedan includes a body 11 mm (0.43 in) wider and 9 mm (0.35 in) lower than that of the A3 Sportback. Early models include 1.4 TFSI (140 PS), 1.8 TFSI (180 PS), and 2.0 TDI (150 PS).[43] The A3 Sedan was unveiled at the 2013 New York Auto Show.[43] The German model went on sale in late summer 2013. Early models include 1.4 TFSI (140 PS), 1.8 TFSI (180 PS), and 2.0 TDI (150 PS).[44] Delivery of the UK models began in autumn of 2013. Early models include 1.4 TFSI (140 PS), 1.8 TFSI (180 PS), and 2.0 TDI (150 PS).[45] In international markets like Pakistan, Audi has introduced it with a 1.2 TFSI engine. This has allowed Audi to bypass high import duties on larger displacement engines, offer the car at a competitive price, and become a leader in the imported luxury car segment.[46] In Malaysia, the Audi A3 was launched in 2014 and sold as two models - a 1.4-liter with 7-speed S-Tronic automatic transmission, and a 1.8-liter with 6-speed DSG and Quattro all-wheel drive. The facelifted version has yet to be launched. In Singapore, the Audi A3 sedan and Sportback are currently available as 1.0-liter turbo models only. A3 Cabrio (2013–present) Audi A3 Cabriolet in Vegas Yellow The A3 cabriolet was offered starting in 2014. It has a three-box body style and a larger boot than the previous model (320 litres versus 260). A3 Sportback (2013–present) Audi A3 Sportback in Glacier White Metallic The Audi A3 Sportback includes a wheelbase 58 mm (2.28 in) over previous model, 35 mm (1.38 in) longer than that of the A3 and a front axle shifted forward by 40 mm (1.57 in) over the previous model. Other features include a choice of 13 body colours (three solid finishes, eight metallic finishes, and two pearl-effect finishes), an optional high-gloss package adding accents around the windows (standard with the Ambiente trim line), six-speed manual transmission (optional S-Tronic) for all engine models, 16 or 17-inch wheels depending on trim line (optional 18-inch wheels), Audi drive select (standard with Ambition) with optional S-Tronic, and optional electromagnetic damper control system. German models went on sale in February 2013. Early models include 1.4 TFSI (122 PS), 1.8 TFSI (180 PS), 1.8 TFSI quattro (180 PS), and 1.6 TDI. 1.2 TFSI (105 PS), 1.4 TFSI (140 PS), 2.0 TDI (150 PS), 2.0 TDI quattro (150 PS), and 2.0 TDI (184 PS) were available in later date. A3 Sportback g-tron (2013–present) Audi A3 Sportback g-tron in Cosmos Blue Metallic It is a version of the A3 Sportback with 1.4 TFSI (110 PS) engine powered by compressed natural gas or Audi e-gas synthetic methane; gas tank made of gas-impermeable polyamide polymer, carbon fiber reinforced polymer (CFRP), glass fiber reinforced polymer; and an electronic gas pressure regulator. The synthetic methane was produced by waste product from a nearby Werlte biogas plant operated by power utility EWE.[47] A3 Sportback e-tron (2014–2018, 2020) A3 Sportback e-tron The plug-in hybrid concept car was unveiled at the 2013 Geneva Motor Show.[48] In May 2013 Audi confirmed its decision to produce a plug-in hybrid version of the A3, the Audi A3 Sportback e-tron, which was scheduled for retail sales in Europe by late 2013, and by mid 2014 in the U.S. and the UK.[49][50] The A3 e-tron shares the same plug-in hybrid powertrain used in both the Volkswagen Golf GTE and Passat GTE. To charge the A3 e-tron, the Audi four rings logo is pulled along to reveal a charging socket.[51] The A3 Sportback e-tron is powered by a 1.4 L TSI gasoline engine that delivers 148 bhp (110 kW) and 184 lb·ft (249 N·m) of torque, coupled with a 101 bhp (75 kW) electric motor, which is integrated into the car's six-speed dual-clutch automatic transmission, for a total combined output of 201 bhp (150 kW) and 243 lb·ft (329 N·m) The plug-in hybrid has an 8.8 kWh battery pack that delivers an all-electric range of 50 km (31 mi) on the NEDC cycle, and a total of 940 km (584 mi). The plug-in hybrid can reach a top speed of 220 km/h (137 mph) and can accelerate from 0–100 km/h (62 mph) in 7.6 seconds. According to Audi the car has an average fuel efficiency of 188 mpg equivalent and CO2 emissions of 35 g/km.[49][50] A3 Sportback '40' e-tron (2020, 8V facelift) After some delays, the A3 Sportback e-Tron went on sale across Europe in August 2014.[52] The first 227 units were registered in Germany in August 2014.[53] As of December 2015[update], global sales totaled 12,994 units, of which, 12,945 units were registered in Europe,[54] and 49 units in the United States, where deliveries began in December 2015.[55] Audi discontinued the A3 PHEV Sportback e-tron in Europe in November 2018.[56] However, the model was briefly re-introduced at the end of 2019 for MY20, now called A3 Sportback 40 e-tron under Audi's new naming scheme. The revised A3 e-tron in the UK featured a different level of specification, losing the previously standard LED headlights but gaining Audi's virtual cockpit as standard. The revised model featured the same battery and drivetrain as before, now rated at 22 miles of electric range under the new WLTP test.[57][58] S3 (2013–present) Audi S3 sedan Audi S3 cabriolet 2.0 TFSI quattro in the UK Audi S3 Sportback Audi S3 hatchback (facelift) The third generation Audi S3 is powered by a 2.0 L; 121.1 cu in (1,984 cc) TFSI (turbo gasoline direct injection) inline-four engine, with an output of 221 kW (300 PS; 296 bhp) at 5,500 rpm and 380 N·m (280 lbf·ft) of torque at 1,800–5,500 rpm,[59] with its redline at 6,800 rpm. It features new pistons with stronger bolts and new rings, as well as reinforced connecting rods with new mounts transferring the power to the crankshaft. The cylinder head is made of a new lightweight aluminium alloy designed with high strength and temperature resistance in mind. It has a combined fuel economy of 23 mpg‑US (10 L/100 km; 28 mpg‑imp) manual; and 24 mpg‑US (9.8 L/100 km; 29 mpg‑imp) with S tronic. The engine weighs in at 148 kg (326 lb), 5 kg (11 lb) lighter than the previous generation. The S3 is capable of 0–100 km/h (62 mph) in 4.8–5.2 seconds and has an electronically limited top speed of 155 mph (249 km/h).[60] RS 3 (2015–present) Audi RS 3 Sportback (8V) in Geneva, Switzerland Audi RS 3 sedan (8V) (facelift) Details for the RS 3 Sportback were revealed in December 2014.[33] It went on sale in the first quarter of 2015 and featured a 2.5 litres (2,480 cc) straight-5 engine with 367 PS (270 kW; 362 hp) and 465 N·m (343 lbf·ft) of torque. The RS 3 Sportback is equipped with 7-speed dual clutch S tronic transmission and quattro all-wheel drive system. Scott Keogh of Audi of America said in April 2015 that he's "confident" we'll see the car come to the United States.[61] In 2017, the RS3 sedan or saloon was added to the line-up. The RS3 can be ordered with a fixed-suspension or an adjustable magnetic damper. Depending on the country, the RS3 can be purchased with different optional packages. For example, the Black Optic package includes high-gloss black 19-inch wheels, high-gloss black outside mirror covers, and a high-gloss black trunk lip spoiler, while the Dynamic package consists of titanium 19-inch wheels with summer performance tires, red brake calipers, and a sport exhaust system. 2016 facelift 2018 facelift Audi A3 Saloon 2016 facelift Audi A3 Sportback 2016 facelift Audi A3 Sportback 2020 facelift Audi A3 Sportback interior (with Virtual Cockpit) After four years, the third-generation Audi A3 was given a facelift for the model year 2016, which also coincided with the 20th anniversary of the A3 name. The facelifted model was first unveiled through a set of official images in April 2016. The new A3 sedan was given significant cosmetic updates, which were in-line with the automaker's new design philosophy. As a result, the 2016 Audi A3 sedan featured the Matrix LED headlamps that were earlier seen in the A8 flagship sedan and the R8 supercar. The front grille was also given a refreshed treatment that made the new A3 look like its elder siblings. Changes on the sides and rear were minimal, with only the taillights getting new LED treatment. There were multiple updates on the interiors as well, with a fully digital 12.3-inch instrument cluster screen placed behind the steering wheel available as an optional upgrade. Sold in Europe and released in the United States for the 2016 model year.[62] Safety 2012 pre-facelift Audi A3 Sportback interior Euro NCAP tested a third-generation Audi A3, 3-door hatchback with front airbags, side airbags, seatbelt pretensioners and load limiters as standard and scored it accordingly: Euro NCAP test results Audi A3 LHD, 3-door hatchback (2012)[63] Test Points % Overall: Adult occupant: 34 95% Child occupant: 42 87% Pedestrian: 27 74% Safety assist: 6 86% Engines Petrol engine[64] Model Years Engine displacement Engine code Power Torque 0–100 km/h(0–62 mph) Top speed Transmission Standard Optional A3 1.4 TFSI g-tron 2014–2019 1395 cc I4 CPWA 110 PS (81 kW; 110 hp) at 4,800–6,000 rpm 200 N·m (148 lbf·ft) at 1,500–3,500 rpm 10.8 s 197 km/h(122 mph) 6-spd manual 7-spd S tronic|- A3 1.0 TFSI / 30 TFSI[65] 2016–present 999 cc I3 CHZD, DKRF 116 PS (85 kW; 114 hp) at 5,000–5,500 rpm 200 N·m (148 lbf·ft) at 2,000–3,500 rpm 9.9 s 206 km/h(128 mph) 6-spd manual 7-spd S tronic A3 1.2 TFSI 2013–2018 1197 cc I4 CJZA, CYVB 105 PS (77 kW; 104 hp) at 5,000 rpm 175 N·m (129 lbf·ft) at 1,400–3,500 rpm 10.3 s 193 km/h(120 mph) 6-spd manual 7-spd S tronic A3 1.4 TFSI 2013–2018 1395 cc I4 CXSB, CZC,CZCA 125 PS (92 kW; 123 hp) at 5,000–6,000 rpm 200 N·m (148 lbf·ft) at 1,400–4,000 rpm 9.3 s 203 km/h(126 mph) 6-spd manual 7-spd S tronic A3 1.4 TFSI 2013–2018 1395 cc I4 CZEA 150 PS (110 kW; 148 hp) at 5,000–6,000 rpm 250 N·m (184 lbf·ft) at 1,500–3,500 rpm 8.2 s 218 km/h(135 mph) 6-spd manual 7-spd S tronic A3 1.8 TFSI 2013–2016 1798 cc I4 CJSA 180 PS (132 kW; 178 hp) at 5,100–6,200 rpm 250 N·m (184 lbf·ft) at 1,250–5,000 rpm 7.2 s 232 km/h(144 mph) 6-spd manual 6-spd S tronic A3 2.0 TFSI / 40 TFSI 2016–present 1984 cc I4 CHHB 220 PS (162 kW; 217 hp) at 4,500–6,200 rpm 350 N·m (258 lbf·ft) at 1,600–4,400 rpm 5.8 s 232 km/h(144 mph) 6-spd S tronic N/A S3 2.0 TFSI 2013–2016 1984 cc I4 CJXC 300 PS (221 kW; 296 hp) at 5,500–6,200 rpm 380 N·m (280 lbf·ft) at 1,800–5,500 rpm 4.6 s[d] 249 km/h(155 mph) 6-spd manual 6-spd S tronic[c] S3 2.0 TFSI 2016–2018 1984 cc I4 CJXG / DJHA 310 PS (228 kW; 306 hp) at 5,800–6,200 rpm 380 N·m (280 lbf·ft) at 1,800–5,700 rpm 4.6 s 250 km/h(155 mph) 7-spd S tronic[c] N/A S3 2.0 TFSI 2019–present 1984 cc I4 DNUE 300 PS (221 kW; 296 hp) at 5,300–6,500 rpm 400 N·m (295 lbf·ft) at 2,000–5,200 rpm 4.7 s[f] 250 km/h(160 mph) 7-spd S tronic[g] N/A RS 3 2.5 TFSI 2015–2016 2480 cc I5 CZGB 367 PS (270 kW; 362 hp) at 5,550–6,800 rpm 465 N·m (343 lbf·ft) at 1,625–5,550 rpm 4.3 s 280 km/h(174 mph) 7-spd S tronic N/A RS 3 2.5 TFSI 2017–2018 2480 cc I5 DAZA 400 PS (294 kW; 395 hp) at 5,850–7,000 rpm 480 N·m (354 lbf·ft) at 1,700–5,850 rpm 4.1 s 280 km/h(174 mph) 7-spd S tronic N/A RS 3 2.5 TFSI 2017–2018 2480 cc I5 DNWA 400 PS (294 kW; 395 hp) at 5,850–7,000 rpm 480 N·m (354 lbf·ft) at 1,950–5,850 rpm 3.8 s 280 km/h(174 mph) 7-spd S tronic N/A Diesel engine[64] Model Years Engine displacement Engine code Power Torque 0–100 km/h(0–62 mph) Top speed Transmission Standard Optional A3 1.6 TDI 2013–2017 1598 cc I4 CLHA 105, CXXB 110 105 PS (77 kW; 104 hp) at 3,000–4,000 rpm 110 PS (81 kW; 108 hp) at 3,000–4,000 rpm 230 N·m (170 lbf·ft) at 1,500–2,750 rpm 10.5 s 202 km/h(126 mph) 6-spd manual 6-spd

(Learn how and when to remove this template message) Key features The following key features can be observed in all suggested 4G technologies: Physical layer transmission techniques are as follows:[26] MIMO: To attain ultra high spectral efficiency by means of spatial processing including multi-antenna and multi-user MIMO Frequency-domain-equalization, for example multi-carrier modulation (OFDM) in the downlink or single-carrier frequency-domain-equalization (SC-FDE) in the uplink: To exploit the frequency selective channel property without complex equalization Frequency-domain statistical multiplexing, for example (OFDMA) or (single-carrier FDMA) (SC-FDMA, a.k.a. linearly precoded OFDMA, LP-OFDMA) in the uplink: Variable bit rate by assigning different sub-channels to different users based on the channel conditions Turbo principle error-correcting codes: To minimize the required SNR at the reception side Channel-dependent scheduling: To use the time-varying channel Link adaptation: Adaptive modulation and error-correcting codes Mobile IP utilized for mobility IP-based femtocells (home nodes connected to fixed Internet broadband infrastructure) As opposed to earlier generations, 4G systems do not support circuit switched telephony. IEEE 802.20, UMB and OFDM standards[27] lack soft-handover support, also known as cooperative relaying. Multiplexing and access schemes This section contains information of unclear or questionable importance or relevance to the article's subject matter. Please help improve this section by clarifying or removing indiscriminate details. If importance cannot be established, the section is likely to be moved to another article, pseudo-redirected, or removed.Find sources: "4G" – news · newspapers · books · scholar · JSTOR (May 2010) (Learn how and when to remove this template message) Recently, new access schemes like Orthogonal FDMA (OFDMA), Single Carrier FDMA (SC-FDMA), Interleaved FDMA, and Multi-carrier CDMA (MC-CDMA) are gaining more importance for the next generation systems. These are based on efficient FFT algorithms and frequency domain equalization, resulting in a lower number of multiplications per second. They also make it possible to control the bandwidth and form the spectrum in a flexible way. However, they require advanced dynamic channel allocation and adaptive traffic scheduling. WiMax is using OFDMA in the downlink and in the uplink. For the LTE (telecommunication), OFDMA is used for the downlink; by contrast, Single-carrier FDMA is used for the uplink since OFDMA contributes more to the PAPR related issues and results in nonlinear operation of amplifiers. IFDMA provides less power fluctuation and thus requires energy-inefficient linear amplifiers. Similarly, MC-CDMA is in the proposal for the IEEE 802.20 standard. These access schemes offer the same efficiencies as older technologies like CDMA. Apart from this, scalability and higher data rates can be achieved. The other important advantage of the above-mentioned access techniques is that they require less complexity for equalization at the receiver. This is an added advantage especially in the MIMO environments since the spatial multiplexing transmission of MIMO systems inherently require high complexity equalization at the receiver. In addition to improvements in these multiplexing systems, improved modulation techniques are being used. Whereas earlier standards largely used Phase-shift keying, more efficient systems such as 64QAM are being proposed for use with the 3GPP Long Term Evolution standards. IPv6 support Main articles: Network layer, Internet protocol, and IPv6 Unlike 3G, which is based on two parallel infrastructures consisting of circuit switched and packet switched network nodes, 4G is based on packet switching only. This requires low-latency data transmission. As IPv4 addresses are (nearly) exhausted,[Note 1][28] IPv6 is essential to support the large number of wireless-enabled devices that communicate using IP. By increasing the number of IP addresses available, IPv6 removes the need for network address translation (NAT), a method of sharing a limited number of addresses among a larger group of devices, which has a number of problems and limitations. When using IPv6, some kind of NAT is still required for communication with legacy IPv4 devices that are not also IPv6-connected. As of June 2009[update], Verizon has posted Specifications [1] that require any 4G devices on its network to support IPv6.[29] Advanced antenna systems Main articles: MIMO and MU-MIMO The performance of radio communications depends on an antenna system, termed smart or intelligent antenna. Recently, multiple antenna technologies are emerging to achieve the goal of 4G systems such as high rate, high reliability, and long range communications. In the early 1990s, to cater for the growing data rate needs of data communication, many transmission schemes were proposed. One technology, spatial multiplexing, gained importance for its bandwidth conservation and power efficiency. Spatial multiplexing involves deploying multiple antennas at the transmitter and at the receiver. Independent streams can then be transmitted simultaneously from all the antennas. This technology, called MIMO (as a branch of intelligent antenna), multiplies the base data rate by (the smaller of) the number of transmit antennas or the number of receive antennas. Apart from this, the reliability in transmitting high speed data in the fading channel can be improved by using more antennas at the transmitter or at the receiver. This is called transmit or receive diversity. Both transmit/receive diversity and transmit spatial multiplexing are categorized into the space-time coding techniques, which does not necessarily require the channel knowledge at the transmitter. The other category is closed-loop multiple antenna technologies, which require channel knowledge at the transmitter. Open-wireless Architecture and Software-defined radio (SDR) One of the key technologies for 4G and beyond is called Open Wireless Architecture (OWA), supporting multiple wireless air interfaces in an open architecture platform. SDR is one form of open wireless architecture (OWA). Since 4G is a collection of wireless standards, the final form of a 4G device will constitute various standards. This can be efficiently realized using SDR technology, which is categorized to the area of the radio convergence. History of 4G and pre-4G technologies The 4G system was originally envisioned by the DARPA, the US Defense Advanced Research Projects Agency.[citation needed] DARPA selected the distributed architecture and end-to-end Internet protocol (IP), and believed at an early stage in peer-to-peer networking in which every mobile device would be both a transceiver and a router for other devices in the network, eliminating the spoke-and-hub weakness of 2G and 3G cellular systems.[30][page needed] Since the 2.5G GPRS system, cellular systems have provided dual infrastructures: packet switched nodes for data services, and circuit switched nodes for voice calls. In 4G systems, the circuit-switched infrastructure is abandoned and only a packet-switched network is provided, while 2.5G and 3G systems require both packet-switched and circuit-switched network nodes, i.e. two infrastructures in parallel. This means that in 4G traditional voice calls are replaced by IP telephony. In 2002, the strategic vision for 4G—which ITU designated as IMT Advanced—was laid out. In 2004, LTE was first proposed by NTT DoCoMo of Japan.[31] In 2005, OFDMA transmission technology is chosen as candidate for the HSOPA downlink, later renamed 3GPP Long Term Evolution (LTE) air interface E-UTRA. In November 2005, KT Corporation demonstrated mobile WiMAX service in Busan, South Korea.[32] In April 2006, KT Corporation started the world's first commercial mobile WiMAX service in Seoul, South Korea.[33] In mid-2006, Sprint announced that it would invest about US$5 billion in a WiMAX technology buildout over the next few years[34] ($6.42 billion in real terms[35]). Since that time Sprint has faced many setbacks that have resulted in steep quarterly losses. On 7 May 2008, Sprint, Imagine, Google, Intel, Comcast, Bright House, and Time Warner announced a pooling of an average of 120 MHz of spectrum; Sprint merged its Xohm WiMAX division with Clearwire to form a company which will take the name "Clear". In February 2007, the Japanese company NTT DoCoMo tested a 4G communication system prototype with 4×4 MIMO called VSF-OFCDM at 100 Mbit/s while moving, and 1 Gbit/s while stationary. NTT DoCoMo completed a trial in which they reached a maximum packet transmission rate of approximately 5 Gbit/s in the downlink with 12×12 MIMO using a 100 MHz frequency bandwidth while moving at 10 km/h,[36] and is planning on releasing the first commercial network in 2010. In September 2007, NTT Docomo demonstrated e-UTRA data rates of 200 Mbit/s with power consumption below 100 mW during the test.[37] In January 2008, a U.S. Federal Communications Commission (FCC) spectrum auction for the 700 MHz former analog TV frequencies began. As a result, the biggest share of the spectrum went to Verizon Wireless and the next biggest to AT&T.[38] Both of these companies have stated their intention of supporting LTE. In January 2008, EU commissioner Viviane Reding suggested re-allocation of 500–800 MHz spectrum for wireless communication, including WiMAX.[39] On 15 February 2008, Skyworks Solutions released a front-end module for e-UTRAN.[40][41][42] In November 2008, ITU-R established the detailed performance requirements of IMT-Advanced, by issuing a Circular Letter calling for candidate Radio Access Technologies (RATs) for IMT-Advanced.[43] In April 2008, just after receiving the circular letter, the 3GPP organized a workshop on IMT-Advanced where it was decided that LTE Advanced, an evolution of current LTE standard, will meet or even exceed IMT-Advanced requirements following the ITU-R agenda. In April 2008, LG and Nortel demonstrated e-UTRA data rates of 50 Mbit/s while travelling at 110 km/h.[44] On 12 November 2008, HTC announced the first WiMAX-enabled mobile phone, the Max 4G[45] On 15 December 2008, San Miguel Corporation, the largest food and beverage conglomerate in southeast Asia, has signed a memorandum of understanding with Qatar Telecom QSC (Qtel) to build wireless broadband and mobile communications projects in the Philippines. The joint-venture formed wi-tribe Philippines, which offers 4G in the country.[46] Around the same time Globe Telecom rolled out the first WiMAX service in the Philippines. On 3 March 2009, Lithuania's LRTC announcing the first operational "4G" mobile WiMAX network in Baltic states.[47] In December 2009, Sprint began advertising "4G" service in selected cities in the United States, despite average download speeds of only 3–6 Mbit/s with peak speeds of 10 Mbit/s (not available in all markets).[48] On 14 December 2009, the first commercial LTE deployment was in the Scandinavian capitals Stockholm and Oslo by the Swedish-Finnish network operator TeliaSonera and its Norwegian brandname NetCom (Norway). TeliaSonera branded the network "4G". The modem devices on offer were manufactured by Samsung (dongle GT-B3710), and the network infrastructure created by Huawei (in Oslo) and Ericsson (in Stockholm). TeliaSonera plans to roll out nationwide LTE across Sweden, Norway and Finland.[49][50] TeliaSonera used spectral bandwidth of 10 MHz, and single-in-single-out, which should provide physical layer net bit rates of up to 50 Mbit/s downlink and 25 Mbit/s in the uplink. Introductory tests showed a TCP throughput of 42.8 Mbit/s downlink and 5.3 Mbit/s uplink in Stockholm.[51] On 4 June 2010, Sprint released the first WiMAX smartphone in the US, the HTC Evo 4G.[52] On November 4, 2010, the Samsung Craft offered by MetroPCS is the first commercially available LTE smartphone[53] On 6 December 2010, at the ITU World Radiocommunication Seminar 2010, the ITU stated that LTE, WiMAX and similar "evolved 3G technologies" could be considered "4G".[2] In 2011, Argentina's Claro launched a pre-4G HSPA+ network in the country. In 2011, Thailand's Truemove-H launched a pre-4G HSPA+ network with nationwide availability. On March 17, 2011, the HTC Thunderbolt offered by Verizon in the U.S. was the second LTE smartphone to be sold commercially.[54][55] In February 2012, Ericsson demonstrated mobile-TV over LTE, utilizing the new eMBMS service (enhanced Multimedia Broadcast Multicast Service).[56] Since 2009, the LTE-Standard has strongly evolved over the years, resulting in many deployments by various operators across the globe. For an overview of commercial LTE networks and their respective historic development see: List of LTE networks. Among the vast range of deployments, many operators are considering the deployment and operation of LTE networks. A compilation of planned LTE deployments can be found at: List of planned LTE networks. Disadvantages 4G introduces a potential inconvenience for those who travel internationally or wish to switch carriers. In order to make and receive 4G voice calls, the subscriber handset must not only have a matching frequency band (and in some cases require unlocking), it must also have the matching enablement settings for the local carrier and/or country. While a phone purchased from a given carrier can be expected to work with that carrier, making 4G voice calls on another carrier's network (including international roaming) may be impossible without a software update specific to the local carrier and the phone model in question, which may or may not be available (although fallback to 3G for voice calling may still be possible if a 3G network is available with a matching frequency band).[57] Beyond 4G research Main article: 5G A major issue in 4G systems is to make the high bit rates available in a larger portion of the cell, especially to users in an exposed position in between several base stations. In current research, this issue is addressed by macro-diversity techniques, also known as group cooperative relay, and also by Beam-Division Multiple Access (BDMA).[58] Pervasive networks are an amorphous and at present entirely hypothetical concept where the user can be simultaneously connected to several wireless access technologies and can seamlessly move between them (See vertical handoff, IEEE 802.21). These access technologies can be Wi-Fi, UMTS, EDGE, or any other future access technology. Included in this concept is also smart-radio (also known as cognitive radio) technology to efficiently manage spectrum use and transmission power as well as the use of mesh routing protocols to create a pervasive network. Past 4G networks Country Network Shutdown date Standard Notes Jamaica Digicel 2018-10-31 WiMAX [59] Malaysia Yes 4G 2019-10-01 WiMAX [60][61] Nepal Nepal Telecom 2021-12-?? WiMAX [62] Trinidad and Tobago Blink bmobile (TSTT) 2015-03-03 WiMAX [63] United States Sprint 2016-03-31 WiMAX [64][65] T-Mobile (Sprint) 2022-06-30 LTE [66][67] See also 4G-LTE filter Comparison of mobile phone standards GSM, CDMA, LTE Comparison of wireless data standards HSPA+, WiMAX, EV-DO Wireless device radiation and health Notes ^ The exact exhaustion status is difficult to determine, as it is unknown how many unused addresses exist at ISPs, and how many of the addresses that are permanently unused by their owners can still be freed and transferred to others.

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