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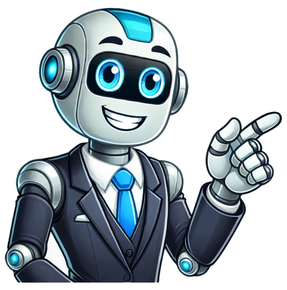

Bluetooth: You've probably seen it on your smartphone, tablet, Mac, or PC laptop, and you might know it has something to do with wireless communications or peripherals. But what is Bluetooth---and is it similar to Wi-Fi? We'll explain. Bluetooth is a short-range wireless communications standard designed specifically for replacing wired connections in nearby peripheral devices like headsets, speakers, game controllers, mice, and keyboards. It can also be used to transfer files between devices in the same room. Bluetooth originated as a project to link cell phones to laptop computers in the mid-1990s. With several low-power radio communications protocols in development at Intel, Ericsson, and Nokia, someone proposed that they merge into an industry standard. The standard solidified in 1998 as "Bluetooth" and has been managed by the Bluetooth Special Interest Group, a not-for-profit corporation, ever since. Jim Kardach of Intel named the Bluetooth standard after Harald "Bluetooth" Gormsson, a king of Denmark and Norway in the 10th century AD. Some historians guess that Gormsson may have acquired his "Bluetooth" nickname from a bad, discolored tooth. In a 2008 editorial for EETimes, Kardach states that he chose Bluetooth name because the king was "famous for uniting Scandinavia just as we intended to unite the PC and cellular industries with a short-range wireless link." Kardach originally intended the name to just be the code name for the project, but it stuck. The name choice extended to the logo for Bluetooth, still in use today, which is a combination of two runic letters ("H" and "B") that initialize Harald Bluetooth's name. The key reason for all wireless technologies is baked into their name: wireless. Wires---or cables---are cumbersome and sometimes expensive. Cables reduce mobility and make devices less portable. Bluetooth uses radio waves to remove the need for cables for peripherals and short-range data transfers, and it does so while sipping power, which makes it great for small, battery-powered peripherals and mobile devices. Bluetooth is a common feature on modern tablets, PCs, and smartphones. But there's another wireless feature that some may confuse with Bluetooth: Wi-Fi. Why are there two different wireless standards---why not just one? In general, Bluetooth is designed for ad hoc, direct device-to-device connections. It supports lower data transfer speeds, but uses far less power than other wireless technologies (like Wi-Fi) as a result, so it's great for mobile devices. As a result of the low power usage, it also has a far shorter communications range---usually around 30 feet. In contrast, Wi-Fi uses a hub-based network designed especially for networking. It supports much higher data transfer speeds but uses more power than Bluetooth as a result. It also supports a much longer range---typically hundreds of feet. So if you compare the two, the properties of Bluetooth make it great for small gadgets you want to wirelessly link together within the same room, but poor for high-speed network access. And Wi-Fi is great for high-speed wireless networking, but is too power-hungry (and not ideally architected) for ad-hoc connections between devices, although there are exceptions like Wi-Fi Direct. Ultimately, standards live and die by how widely they get adopted. Bluetooth has wide device support for short-range connections so it will likely be the default method for wireless peripherals for some time to come. Happy linking! Bluetooth is more than just a technology.The Bluetooth Special Interest Group (SIG)is a community of some of the most inventive minds and organizations with the shared vision of creating a better world through connection. Together, we advance, protect, and promote Bluetooth technology, the global standard forconnection. Latest Resources Blog postsCase studiesInfographicsPapersStudy guidesVideos View all resources by Chris Woodford. Last updated: March 31, 2023. Is there anything worse than wires? If you've ever hooked up a computer and half a dozen peripherals (add-ons), a digitaltelevision and a DVD player, or run your owntelephone extensions through the house, you'll know just what a pain all those cables can be. Wouldn't it be nice if there were a way of bringing electronic gadgetstogether so they could share whatever signals they need without anywires at all? Enter Bluetooth! It's a simple way for cellphones,printers, PCs, digital cameras, and other gadgets to link togetherover relatively short distances using wireless (radio wave)technology. The curious name comes from Harald Bluetooth, a Danish king who united the Scandinavians in the 10th century. Will Bluetoothunite the electronic world the same way? Let's take a closer look! Photo: Almost all new laptops and cellphones have Bluetooth built in. For older laptops and desktop computers without the feature, you can generally add Bluetooth by plugging in a small USB adapter, like these. Contents We're all use to wireless communication by now, even if we don'talways realize it. Radio receivers and television sets pick upprograms beamed in radio waves hundreds (possibly even thousands) ofkm/miles through the air. Cordless telephones use similar technologies tocarry calls from a handset to a base station somewhere in your home. If you use Wi-Fi (wireless Internet), your computer sends andreceives a steady stream of Internet data to and from a router that'sprobably wired directly to the Net. All these technologies involvesending information back and forth not along copper cables but inradio waves buzzing invisibly through the air. Photo: A typical use of Bluetooth: connecting a full-sized keyboard to a tablet or smartphone.Wireless connections like this are particularly useful when you're using portable gadgets, maybe on a trainor a plane, and cables would really get in the way. Bluetooth is a similar radio-wave technology, but it's mainlydesigned for communicating over short distances less than about 10mor 30ft.[1] Typically, you might use it to download photos from adigital camera to a PC, to hook up a wireless mouse to a laptop, tolink a hands-free headset to your cellphone so you can talk anddrive safely at the same time, and so on. Electronic gadgets thatwork this way have built-in radio antennas (transmitters andreceivers) so they can simultaneously send and receive wirelesssignals to other Bluetooth gadgets. Older gadgets can be converted towork with Bluetooth using plug-in adapters (in the form of USB sticks, PCMCIA laptop cards, and so on). The power of the transmittergoverns the range over which a Bluetooth device can operate and,generally, devices are said to fall into one of three classes: class1 are the most powerful and can operate up to 100m (330ft), class 2(the most common kind) operate up to 10m (33ft), and class 3 are theleast powerful and don't go much beyond 1m (3.3ft).[2] Bluetooth sends and receives radio waves in a band of 79 differentfrequencies (channels) centered on 2.45 GHz, set apart fromradio, television, and cellphones, and reserved for use by industrial,scientific, and medical gadgets.[3]Don't worry: you're not going tointerfere with someone's life-support machine by using Bluetooth inyour home, because the low power of your transmitters won't carryyour signals that far! Bluetooth's short-range transmitters are oneof its biggest plus points. They use virtually no power and, becausethey don't travel far, are theoretically more secure than wirelessnetworks that operate over longer ranges, such as Wi-Fi. (In practice,there are some security concerns.) Photo: Connecting with Bluetooth is simplicity itself. Simply enable Bluetooth on both devices, put them reasonably near one another, and they'll recognize one another and make a "pairing request." Select "pair" on each device and they connect. The devices can be completely different things: here I'm pairing an LG smartphone (left) with an Apple iPod Touch (right). Bluetooth devices automatically detect and connect to one anotherand up to eight of them can communicate at any onetime. They don't interfere with one another because each pair ofdevices uses a different one of the 79 available channels. If twodevices want to talk, they pick a channel randomly and, if that'salready taken, randomly switch to one of the others (a technique knownas spread-spectrum frequency hopping). To minimize the riskof interference from other electrical appliances (and also to improvesecurity), pairs of devices constantly shift the frequency they'reusingthousands of times a second. When a group of two or more Bluetooth devices are sharinginformation together, they form a kind of ad-hoc, minicomputer network called a piconet. Other devices can join or leave anexisting piconet at any time. One device (known as the master) actsas the overall controller of the network, while the others (known asslaves) obey its instructions. Two or more separate piconets can alsojoin up and share information forming what's called a scatternet. Photo: Monitoring a patient's health with Bluetooth: the smartphone is taking readings from the blood-pressure monitor and pulse oximeter (finger-mounted oxygen monitor).Photo by Patricia Deal courtesy of US Armyand DVIDS. Photo: Spread-spectrum was designed for use in wartime to stop jamming of radio signals between warships and the torpedoes they fired. Photo by John L. Beeman courtesy of US Navyand Wikimedia Commons. Suppose you're talking to a friend on a walkie-talkie or with a CB (citizen's band) radio, butthere are other people using the same frequency and your conversation keeps getting interrupted. What can you do?Most experienced radio users know the answer: you both change to a different frequency (band) and resume your conversationthere. And you can keep on switching band until you find a place where you can happily talk without interruption. In theory, you could use thesame technique for covert communication: if you were talking over the radio and someone was eavesdropping, you couldgive a code-word to your friend and hastily switch to another, pre-arranged frequency band where the eavesdropper wouldn't find you(although they'd most likely still pick up your signal sooner or later).Radios are clever electronic gadgets, so why can't they do this neat trick for themselves? Why can't they simply switch to another frequencyautomatically to prevent interference and eavesdropping? This is the basic idea behind a technique called spread-spectrum frequency hopping, where signals are rapidly and randomly switched across a wide range of different frequencies to improve the security and reliabilityof wireless communication. Who invented it?Numerous inventors contributed to the invention of spread-spectrum, including electricity pioneerNikola Tesla (18561943)and US actress Hedy Lamarr (19132000), who, with the help of George Antheil, developed a practical system for the US military during World War II. While modern spread-spectrum systems are electronically controlled, Lamarr's, which is illustrated below, was based on the mechanical, punched paper-tape technology originally used in player pianos. The sender and receiver each had identicalmachines with precisely synchronized electric motors that slowly pulled lengths of paper tape through them. The two tapes were punched with matching patterns of holes indicating which of 88 different radio frequencies the sender and receiver should use to communicate with each other at any particular time. As the tape chugged through the machines, communication switched from one frequency to another, in tandem, in a way that was completely unpredictable to outside observers. Since the radio transmissions were often extremely brief signals for steering torpedoes, it was quite likely that an enemy wouldn't pick them up at all or know what they meant even if they did. Artwork: Secret, spread-spectrum communication, as envisaged by Hedy Lamarr. I've colored and simplified it to make it easier to follow. A length of paper tape (blue) is punched with holes that encode a secret list of frequencies. A machine like a player-piano detector (red) reads the pattern of holes and sends corresponding electrical signals to a radio tuning system (green) that picks one of 88 possible frequencies on which to beam signals out to the receiver using a standard radio transmitter (orange). The receiver has similar equipment and switches to the same frequency at the same time. Artwork from US Patent 2,292,387: Secret communication system courtesy of US Patent and Trademark Office. Further reading Wireless is always less secure than wired communication. Remember how old spy films used to show secret agentstapping into telephone wires to overhear people's conversations?Cracking wired communication is relatively difficult. Eavesdroppingon wireless is obviously much easier becauseinformation is zapping back and forth through the open air. All youhave to do is be in range of a wireless transmitter to pick up itssignals. Wireless Internet networks are encrypted (use scrambledcommunications) to get around this problem.How secure is Bluetooth? Like Wi-Fi, communications are encrypted too and there are numerous other security features. You canrestrict certain devices so they can talk only to certain other,trusted devicesfor example, allowing your cellphone to be operatedonly by your Bluetooth hands-free headset and no-one else's. This iscalled device-level security. You can also restrict the thingsthat different Bluetooth gadgets can do with other devices usingwhat's called service-level security.Criminals get more sophisticated all the time; you've probably heard aboutbluebugging (people taking over your Bluetooth device without your knowledge), bluejacking (where people send messages to other people's devices, often for advertising purposes), andbluesnarfing(downloading information from someone else's device using a Bluetooth connection)and doubtless there are more ways of hacking into Bluetooth networks still to come. Generally, though, providing you take reasonable and sensible precautions if youuse Bluetooth devices in public places, security shouldn't worry you too much. Photo: Connecting a wireless phone to a wireless speaker with Bluetooth. Is Bluetooth better or worse than Wi-Fi? People often get confused by Bluetooth and Wi-Fi because, at first sight, they seem to do similar things. In fact, they're very different. Bluetooth ismainly used for linking computers and electronic devices in an ad-hocway over very short distances, often for only brief or occasionalcommunication using relatively small amounts of data. It's relativelysecure, uses little power, and connects automatically. Wi-Fi is designed to shuttle muchlarger amounts of data between computers and the Internet, often overmuch greater distances. It can involve more elaborate security and itgenerally uses much higher power. Bluetooth and Wi-Fi arecomplementary technologies, not rivals, and you can easily useboth together to make your electronic gadgets work more conveniently for you! Photo: Look no wires: A pair of Marley Bluetooth loudspeakers. One of them is battery powered, for perfect portabilityor you can use them together on AC power. How is Bluetooth evolving? Bluetooth has often been quite tricky to use: like any wireless technology, it's another battery drainer formobile devices; you can often step out of range, making communication erratic or impossible; and even getting twoBluetooth devices to talk to one another in the first place isn't always as simple as it should be. The world of mobile devices is changing as we move toward the so-called Internet of Things (where all kinds of everyday objects become net-connected)and Bluetooth has to keep evolving to keep up. Recognizing the need to connect an increasing range of devices, more quickly, and more securely, Bluetooth's developers are regularly coming up with improved versions. First, there was Bluetooth BR/EDR (Basic Rate/Enhanced Data Rate, technically Bluetooth Version 2.1), offering simpler connectivity between devices and better security. Next came Bluetooth Highspeed (Bluetooth Version 3.0), which offered faster communication and lower power consumption. More recently, we've had Bluetooth Smart or Bluetooth Low Energy (technically referred to as Bluetooth Version 4.0+); As these names suggest, this version is better at connecting a wider range of simpler devices, uses much less power, and is much easier to integrate into mobile (iOS and Android) applications.The latest version, Bluetooth 5, offers another boost in speed, range, and bandwidth.Another innovation called Auracast (formerly "Bluetooth Audio Sharing") makes it possible for one audio device (such as a smartphone) to power unlimited other devices (multiple sets of headphones or hearing aids, for example). Chris Woodford is the author and editor of dozens of science and technology books for adults and children, including DK's worldwide bestselling Cool Stuff series and Atoms Under the Floorboards, which won the American Institute of Physics Science Writing award in 2016. You can hire him to write books, articles, scripts, corporate copy, and more via his website chriswoodford.com.Bluetooth is one of those technologies you probably use daily without thinking too much about it. Maybe its for your wireless headphones, a smartwatch, or your cars infotainment system. Did you happen to ask yourself questions like What is Bluetooth? on your computer, or maybe What is Bluetooth used for? or even Why is it called Bluetooth?. In this guide, Ill try to answer all those questions as clearly as possible. Ill also tell you how you can add Bluetooth to a PC, how it works, and how it evolved from a simple wireless standard into something nearly every device supports. Interested? Then, read on: Bluetooth is a wireless form of radio communication designed for transferring data over short-range distances between different types of devices. Bluetooth works using radio signals on the 2.4 GHz frequency, the same as the Wi-Fi 4 (802.11n) and Wi-Fi 6 (802.11ax) wireless networking standards. The Bluetooth brandingSource: Bluetooth Technology WebsiteHowever, its designed to consume less power and cover shorter distances. That makes it ideal for things like sending files between smartphones, connecting a wireless mouse to a laptop, or streaming music to a headset or a portable speaker. So now you know what Bluetooth is. The next obvious question is: How does Bluetooth work exactly between two devices? The answer is relatively simple: when two or more devices connect and communicate over Bluetooth, the data exchanged between them is sent via radio waves. Unlike usual Wi-Fi connections, Bluetooth connections are direct, meaning that the devices that transmit data this way do it directly from one to the other, without an intermediary like a router or access point. Bluetooth connections are made directly between devices, without intermediariesSource: Davide Boscolo on UnsplashWhen two Bluetooth-enabled devices are within range of one another, they can automatically detect each other, and you can pair/connect them. What is Bluetooth pairing, you ask? Pairing two Bluetooth devices is a sort of a handshake or an exchange of information between them. Just like when you meet someone new, and you introduce yourselves to know who youre talking with, so do Bluetooth devices reveal their identity. In other words, Bluetooth pairing allows the devices involved to register and memorize the identity of the other. Obviously, Bluetooth pairing only needs to happen once; afterward, Bluetooth connections are established almost instantly between previously paired devices. Bluetooth pairing earphones with a Samsung Galaxy smartphoneAfter establishing a line of communication, data can be sent over 79 different radio frequencies within the 2.4 GHz band. While at first, the Bluetooth-enabled devices randomly choose only one of these frequencies, once the connection is made, they will jump from one frequency to another multiple times every second. There are four main types of Bluetooth radios, from Class 1 to Class 4:Class 1 Bluetooth is used in industrial environments. It provides a range of up to 100 meters (328 feet), but it uses quite a bit of electrical power - 100 mW.Class 2 Bluetooth is the most common, especially on mobile devices, as it uses only 2.5 mW of power and provides a range of up to 10 meters (33 feet).Class 3 uses 1 mW of power and provides a range of only 1 meter (3.3 feet).Class 4 can use a maximum of 0.5 mW of power and has a range of fewer than 0.5 meters (1.64 feet). The Bluetooth logo (symbol) Bluetooth technology is used in many different types of devices. Some devices with Bluetooth radio chips are not even close to what you might think of as Bluetooth-enabled. Among many other types of devices, you can find Bluetooth in:Smartphones - The most common use of Bluetooth is to allow smartphones to communicate with each other, with computers, and with other devices like headsets or portable speakers.Computers, laptops, and tablets - Many tablets and notebooks, as well as many desktop computers, have Bluetooth radio chips. You can use them to connect mobile keyboards, mice, wireless headphones, and other gadgets.Gaming consoles - Bluetooth is also present on gaming consoles. For example, you can link the Nintendo Switch and the Sony PlayStation controllers to their respective consoles through Bluetooth, in addition to cable.Other devices - Bluetooth can also be used by wireless home entertainment systems, audio car systems, and personal health devices such as smartwatches, heart rate monitors, Nike+ training shoes, etc. Devices that can connect via BluetoothTIP: If youre using Windows 11 and want to try it out, heres how to turn on Bluetooth on your laptop. Bluetooth specifications change over time, getting new powers and features and adjusting to modern requirements. However, Bluetooth versions are formalized into standards created by the Bluetooth Special Interest Group (SIG), an alliance of over 30,000 companies worldwide (I discuss a bit more about them later in this article). If youre curious about the Bluetooth version your device supports, or if youre shopping for an adapter and want the best one, you should know what the major versions offer. At the moment, there are six main Bluetooth versions: The earliest version, Bluetooth 1.0, was a bit rough. Initially, it had many issues, but the later iterations, Bluetooth 1.1 and Bluetooth 1.2, fixed many of them. The fastest data transmission speed you could achieve with it was 732.2 kbit/s. It worked, but it was slow and unreliable.The next iteration, Bluetooth 2.0, was released in 2004 and was capable of data transmissions of up to 2.1 Mbit/s. On July 26, 2007, Bluetooth 2.1 appeared, offering better security and a superior pairing experience.Bluetooth 3.0 came out on April 21, 2009, and promised theoretical data transfer speeds of up to 3 Mbit/s natively and up to 24 Mbit/s when using its new enhanced Wi-Fi mode. It could be pretty fast, but in real life, it proved to be quite unstable and also battery-draining. You might still find it today, albeit only on some low-end smartphones and other portable devices. An old Galaxy Tab 7.7 that used Bluetooth 3.0Source: Samsung The big leap came with Bluetooth 4.0, a standard that significantly improved over Bluetooth 3.0 and introduced Bluetooth Low Energy, a version thats highly power-efficient. In other words, it is perfect for smartwatches, fitness bands, and other small gadgets that run on tiny batteries. It was adopted on June 30, 2010 and was later updated with 4.1 and 4.2, which added better support for internet-connected devices, improved security, and smoother performance.Bluetooth 4.1 came out on December 4, 2013. It added coexistence support for 4G LTE, which meant that Bluetooth transmissions no longer interfered with other wireless technologies. The old Motorola Nexus 6 had Bluetooth 4.1Bluetooth 4.2 was released on December 2, 2014 and brought with it several new features and upgrades, aimed at making Bluetooth connections both smarter and more secure. For instance, it added support for IPv6, allowing IoT (Internet of Things) devices that support Bluetooth Low Energy to connect to the internet without hubs. It also improved security and privacy by making it more difficult for third parties to track devices. These are the Bluetooth standards most common today. Bluetooth 5.0 was released on June 16, 2016. Compared to Bluetooth 4.2, which brought better internet connectivity and security, Bluetooth 5.0 doubled the data speed from 1 Mbps to 2 Mbps, and quadrupled the range. The latter can now extend to up to 240 meters (800 feet), albeit in ideal conditions only. A JBL portable speaker with Bluetooth 5.1Source: JBLOver the next years, Bluetooth 5.1, 5.2, 5.3, and 5.4 updates were also released, adding new features such as faster connection initiation and LE Audio (Low Energy Audio). Bluetooth 5.1 and 5.2 came out in 2019, on January 21 and December 31, while Bluetooth 5.3 was published on July 13, 2021, and Bluetooth 5.4 was launched on February 7, 2023. The Samsung Galaxy Tab S10 FE Plus comes with Bluetooth 5.3 Bluetooth 6.0 came out on September 3, 2024. It makes it easier for devices to know exactly where other Bluetooth devices are. It also adds a new feature that helps measure distance more accurately, which is great for things like smart locks or tracking tags. While there arent any on the market right now, future devices supporting Bluetooth 6.0 will also use less battery and avoid interference by filtering out signals they dont need. Bluetooth 6 will be great for tracking devicesSource: SamsungAnnounced on May 7, 2025, Bluetooth 6.1 improves privacy and power use. It changes how your device hides its identity, making it harder for others to track you. It also does this in a more efficient way, so your battery lasts a bit longer. To better understand how Bluetooth has evolved over the years, heres a comparison of all major and minor versions, including their maximum speeds, range, and each versions key features: Comparison table of Bluetooth versionsAs you can see, each new version of Bluetooth builds on the previous one, adding faster speeds, longer range, and new features. Both Wi-Fi and Bluetooth are ways of transferring data wirelessly. However, the differences between them are significant:Bluetooth is designed to allow devices to communicate wirelessly over short distances, usually about 10 meters. In contrast, Wi-Fi allows for a much broader range (tens to hundreds of meters).The number of devices that can connect via Bluetooth simultaneously is limited. Wi-Fi allows for a much higher number of simultaneously connected devices.Two devices can connect via Bluetooth directly, in a simple manner. When it comes to Wi-Fi, you usually need a third device, like a wireless router or wireless access point, to help connect them.Bluetooth requires only a small amount of power to run. The added benefits of Wi-Fi, such as higher coverage and data transfer speed, translate into much higher power consumption.Bluetooth security protocols are not as advanced as the ones available on Wi-Fi. You know now that Bluetooth is a form of wireless communication between devices, and using it has some downsides. Here are the most prominent ones:Bluetooth usually works for short-range communication onlyThe bandwidth offered by Bluetooth connections is lowBluetooth security is improving, but Wi-Fi is still much more secureIn real life, Bluetooth connections can sometimes drop without any obvious reasonDifferent versions of Bluetooth might not be compatible with each other (for example, a device with Bluetooth 5 might not be able to connect to a Bluetooth 3 device) The answer to this question is a mixed one, in my opinion. It all depends on whether you permanently leave Bluetooth activated on a device plugged into a power socket or on a gadget running on battery. Why is that? As long as Bluetooth is enabled on your device, it continuously scans for other available Bluetooth-enabled devices to connect to. That means that the Bluetooth chip in your device permanently draws electrical power to run. Its not a problem if your device is plugged into an electrical socket. However, keeping Bluetooth active on a battery-powered device, such as a smartphone or tablet, drains your battery a bit faster.Furthermore, if your devices are older, the Bluetooth version on them might not excel in terms of security; each moment you keep it on, you might risk getting hacked. In conclusion, if you have new devices, its okay to leave Bluetooth on. If your devices are older, you should consider turning Bluetooth off when youre not using it. Should you leave Bluetooth on?TIP: Turning Bluetooth on or off in Android is very simple. If youre not sure how to do it, this tutorial explains how to enable or disable Bluetooth on Android devices, including Samsung phones. Are you wondering whether your PC has Bluetooth or not? Finding out is easy, and there is more than one way to do it:A simple method to check if your PC has Bluetooth is by trying to enable it. You can do this fast from Windows quick settings, as well as in the Settings app. Bluetooth in Windows 11Or you can check whether your PC has a Bluetooth chip. Open Device Manager and look for an entry called Bluetooth. If you find it, then your PC has Bluetooth. Bluetooth chip listed in Device Manager on Windows 11TIP: If youre planning to use a wireless keyboard or mouse, Ive already explained how to connect such Bluetooth accessories to your PC. Bluetooth is included in almost every smartphone and tablet. It is also found on all modern laptops. However, not all desktop computers come with Bluetooth chips. Do you want to know how to get Bluetooth on your PC? Did your teacher ask you to describe three ways in which a computer can become Bluetooth enabled?. Here are all the answers:If your PC or device does not have Bluetooth, you can make it Bluetooth-enabled using one of these means:Buy a Bluetooth USB adapter and plug it into a free USB port on your PC or device.Usually, Bluetooth chips are built into Wi-Fi network cards, so you can buy a wireless adapter card and mount it on your desktop PC or laptop.Although rare these days, you could also buy a Wi-Fi + Bluetooth ExpressCard module that you can mount on some older notebooks if they support such modules.Out of all three options to make a PC Bluetooth-enabled, the most common one is using a Bluetooth USB adapter. Such adapters can be found in almost any tech shop, including Amazon. A Bluetooth USB adapter for PCs made by TP-LinkWhen purchasing a Bluetooth USB dongle, please pay attention to the Bluetooth version it supports. You should get one that works with at least Bluetooth 4, preferably Bluetooth 5 or 6. The cheaper USB adapters provide support only for Bluetooth version 3 or even 2.1 and not the newer versions. The more expensive adapters tend to provide support for the latest versions.Here are a few recommendations to get you started in your search for Bluetooth USB adapters: TP-Link USB Bluetooth Adapter for PC and ASUS USB-BT500 Bluetooth 5.0 USB Adapter.Installing such devices is generally a plug-and-play experience. Connect the Bluetooth adapter to a USB port, and Windows detects it and installs its drivers automatically. Then, you can start using the device. If that does not happen, you need to search for drivers on the manufacturers website.Once Bluetooth is installed and working on your computer, you should see its blue icon in the notification area on your taskbar. Bluetooth should also become available in the Quick settings and in the Settings app. If it is not there, the installation was not performed correctly, or you dont have a Bluetooth device. Bluetooth icon shown in Windows 11's taskbarAnd if youre using an iPhone or iPad and youre not sure how to connect accessories, heres how to pair Bluetooth devices with Apple devices. Bluetooth was invented by the Swedish company Ericsson in 1994. Since 1998, the standard has been managed by the Bluetooth Special Interest Group (SIG) - a body that oversees the development of Bluetooth standards and the licensing of Bluetooth technologies and trademarks to manufacturers. Bluetooth Special Interest GroupThe Bluetooth Special Interest Group (SIG) organization is focused on developing the standard, designing new versions, improving specifications, and protecting Bluetooth trademarks. The Bluetooth SIG does not manufacture or sell Bluetooth-enabled products. This is handled by the companies that are part of the group.If a company is interested in licensing Bluetooth technologies, it must become a member of the Bluetooth SIG. This also involves going through a rigid certification process.Bluetooth was the codename of the SIG organization when it was first formed. It is inspired by the 10th-century Danish King Harald Bltand - or Harold Bluetooth in English. He was the first king who united warring factions in parts of what is now Norway, Sweden, and Denmark. If you would like to learn more about him and his deeds, you should check his Wikipedia entry: Harald Bluetooth Gormsson. Harald Bluetooth Gormsson Before closing this tutorial, Im curious to know how you use Bluetooth on your computers and devices. Do you connect Bluetooth devices like portable speakers or headsets to your laptop or smartphone? Maybe you use a fitness tracker, a Bluetooth mouse, or smart gadgets around the house. Comment below, and lets talk about Bluetooth and how you use this technology.We explain everything you need to know about Bluetooth, the long-standing wireless connectivity standard.Photograph: tampatra/Getty ImagesAll products featured on WIRED are independently selected by our editors. However, we may receive compensation from retailers and/or from purchases of products through these links.Almost everyone uses Bluetooth every day, but what is it exactly? Bluetooth is a ubiquitous wireless connectivity standard that connects our headphones, speakers, smartwatches, and smart rings with our phones; headsets, keyboards, and mice with our laptops; and can even be used to broadcast audio to individuals or large audiences in public places with Auracast.In this Bluetooth guide, I'll briefly explain how it works, review its two-decade history to describe the differences between versions, and examine whats next for the standard.How Does Bluetooth Work?Bluetooth enables supported devices to connect wirelessly using high-frequency radio waves. Bluetooth relies on the same 2.4-GHz frequency band as 2.4-GHz Wi-Fi but, thanks to adaptive frequency-hopping (AFH), it avoids crowded frequencies and limits interference. Bluetooth also uses lower power, has less range, and isn't as fast as 2.4-GHz Wi-Fi.Bluetooth has had its share of vulnerabilities, but its not too difficult to stay secure, and the latest versions are far more secure by design. Everyone has encountered Bluetooth pairing problems and annoying glitcheswe have a guide to help you fix Bluetooth issuesbut it's a robust standard that remains enormously convenient and, consequently, hugely popular. Every version of Bluetooth is backward compatible, meaning a Bluetooth 5.3 device can connect to a Bluetooth 4.0 device. But the features and functionality are always limited by the older device.Companies employ Bluetooth in many proprietary features, like Apples AirDrop and Googles Quick Share. While the U1 chip in Apple devices enables ultra-wideband (UWB) technology to determine the direction of your phone and help you share files with nearby devices, AirDrop uses Bluetooth for the initial discovery process and then switches to Wi-Fi to transmit files. Google merged Nearby Share with Samsungs Quick Share in 2024, and much like AirDrop, it uses Bluetooth to establish a connection and then Wi-Fi to transfer files.These are just two examples. Google also has a standard called Fast Pair that quickly connects a wireless device with a smartphone, and it uses Bluetooth too.History of BluetoothBluetooth is named after King Harald Bluetooth Gormssonthe logo is a combination of his runes for his initialswho had a literal blue tooth (it was dead). He united Denmark and Norway in 958. This short-range radio technology grew from a 1996 meeting between Intel, Ericsson, and Nokia. The first version didnt land until 1999, but Bluetooth didnt take off until a few years later.The standard is managed by a not-for-profit Bluetooth Special Interest Group, or Bluetooth SIG, and it's headquartered in the US. While there are thousands of members, the most influential companies help shape the direction of the standard and include companies like Ericsson, Intel, Nokia, Apple, Microsoft, Lenovo, and Google.Every version brought myriad incremental improvements to make Bluetooth faster, more efficient, more secure, and less buggy, but were just going to run through the headline features here.Bluetooth 1.2 in 2003 figured out how to avoid Wi-Fi interference and enabled quicker pairing, helping to popularize the standard.Bluetooth 2.0 in 2004 brought EDR (Enhanced Data Rate), tripling the data rate from 1 to 3 Mbps.Bluetooth 2.1 in 2007 brought SSP (Secure Simple Pairing), enhancing security and reducing power draw.Bluetooth 3.0 + HS (High Speed) in 2009 bumped rates up by initially connecting via Bluetooth and then switching to Wi-Fi.Bluetooth 4.0 LE (Low Energy) landed in 2010 and, as the name suggests, reduced power requirements even further.Bluetooth 4.1 in 2013 allowed Bluetooth devices to communicate with each other.Bluetooth 4.2 boosted data rates and IoT connectivity in 2014.Bluetooth 5 in 2016 increased the potential range massively, going from around 50 meters to well over 200 meters. But range is dependent on the power class, and there are three classes. Class 1 devices have the greatest range and use the most power, Class 2 are limited to around 10 meters, and Class 3 is only 1 meter.Bluetooth 5.1 in 2019 brought faster pairing and better tracking accuracy.Bluetooth 5.2 in 2020 allowed for multiple simultaneous data streams and better control over the power and signal required by connected devices.Bluetooth 5.3 in 2021 brought improvements in audio quality, increased power efficiency, and wider compatibility.Bluetooth 5.4 in 2023 improved security and reduced latency, but it also included functionality aimed at retailers, allowing them to monitor and change electronic shelf labels (ESL). Devices that support ESL are expected to ship in 2027.Bluetooth 6.0 is the latest version, announced in 2024. It includes a precise tracking capability called Channel Sounding that enables two devices to accurately measure the distance between them, alongside various efficiency improvements.How to Use BluetoothOne of the main reasons Bluetooth is so popular is because it's easy to use. You can generally turn Bluetooth on via the settings of your phone or computer and find a menu of available devices to connect with. Sometimes you need to put the device you want to connect with into pairing mode, which may involve holding down a button (refer to the device manufacturer). There's usually a pairing pop-up on one or both devices so you can accept the connection.Bluetooth support is built into the chipsets of many devices, but if your computer or laptop lacks it, you can always add it via a dongle, like this Asus Bluetooth 5.0 Adapter ($18) or this one from Plugable ($17). If range is an issue, this popular Techkey Bluetooth 5.3 Adapter ($22) includes an antenna to boost it.You can also add Bluetooth functionality to headphones, speakers, or car stereos that lack it with something like the 1Mii Bluetooth 5.3 Music Receiver ($17), but the device must have a 3.5-mm port or jack. We have also tested and like Scosche's Bluetooth Radio Transmitter for cars ($30), which adds Bluetooth connectivity to vehicles without it through the cigarette lighter port.Whats Next for Bluetooth?The most exciting new feature on the horizon for Bluetooth is Auracast. Announced by the Bluetooth (SIG) in 2022, the idea is that you will be able to broadcast and join audio streams in public places by selecting a stream from a list (as you currently do to join a Wi-Fi network), by scanning a QR code, or by tapping where you see an Auracast logo.Auracast will allow several people to connect to the same audio stream simultaneously and could be used to watch a movie together on a smartphone in the back of the car, get audio from TVs in public spaces like the gym, or enhance accessibility for the deaf and hard of hearing who could stream audio directly to their hearing aids at a public concert.The catch is that devices must support Bluetooth 5.2 or later and the Public Broadcast Profile (PBP) to receive Auracast streams. It will likely take a while for devices with transmitter capabilities to roll out, though we may see plug-ins to enable this in the short term. Venue adoption is another piece of the puzzle, as they will have to deploy Auracast broadcast transmitters, so it may be a few years before this is widely available.Power up with unlimited access to WIRED. Get best-in-class reporting that's too important to ignore for just $2.50 $1 per month for 1 year. Includes unlimited digital access and exclusive subscriber-only content. Subscribe Today.Bluetooth is found in just about every new device you buy, from wireless headphones and smartphones to wireless speakers and soundbars, so a new standard being released is big news.While Bluetooth 5.0 (and iterations of, up to 5.4) is currently found in wireless devices launched in recent years, Bluetooth 6.0 has now been announced; and it brings some useful new features to play.Let's see what's new...You may like Bluetooth 6.0: new featuresBetter sound qualityBluetooth 6.0 supports a new codec called LC3plus. This is an evolution of the LC3 codec that launched as part of Bluetooth LE (Low Energy) as the successor to the long-adopted SBC codec.Theoretically, this supports audio up to 32-bit/96kHz, leading it to be certified as 'Hi-res Audio Wireless' by the Japan Audio Society, and is being sold as delivering quality lossless streaming.There are, however, some doubts as to whether this will actually improve Bluetooth sound quality in practical terms.LC3plus also promises latency as low as 7ms.Unlike 'standard' LC3, however, LC3plus is licensed, so manufacturers will have to pay to implement it. Which could limit its uptake.More accurate 'find my'The headline new feature is called Channel Sounding. (We know, the Bluetooth SIG the organisation behind Bluetooth standards really needs to work on its feature names.) This basically makes compatible devices better at detecting the distance between each other.This will mainly be useful for the 'find my' features, used by Apple, Samsung, Google and others, and which help you locate a missing device using a map.Using Channel Sounding, devices should be able to identify more precisely the distance between each other across a wider area, with an impressive accuracy of within 1cm.This could also improve the accuracy and reliability of smart locks for both residences and vehicles.No more lip sync issues(Image credit: Earfun)Bluetooth 6.0 could spell an end to lip-syncing issues. That's thanks to the Isochronous Adaptation Layer (ISOAL), which splits longer data packets (such as audio) into smaller data packets.These smaller data packets are easier to send (by a phone, for example), and can then be reassembled into longer data packets once received by the partner device, such as a pair of wireless headphones.This makes transmitting audio more reliable while also lowering latency. It won't make much difference during music listening, but it could put an end to lip-sync issues when using Bluetooth headphones while gaming or watching a movie.Better battery lifeBluetooth 6.0 has more advanced filtering, meaning that instead of automatically scanning all the time, it knows when to scan and when to save its efforts and not transmit redundant data.That makes it more efficient, which should serve to improve the battery life of devices using it.Less interference(Image credit: Jabra)Bluetooth 6.0 is more robust than previous versions, especially in built-up areas with lots of wireless networks which can interrupt your Bluetooth connection.That should be a boon for city dwellers and festival-goers alike.More seamless switchingThe next version of Bluetooth should also make it easier to switch between devices. The same pair of wireless headphones will be able to pair with multiple devices at once (laptops, smartphones, tablets etc), and switch between them without having to be paired anew.This sounds a lot like Bluetooth Multipoint, a feature which is already available, but not on all Bluetooth devices.For more info on it, read what is Bluetooth Multipoint?When will Bluetooth 6.0 arrive?(Image credit: Edifier)It's already here! Sort of. Because while the specs have been finalised, only two Xiaomi phones the Redmi K80 Pro and Redmi Turbo 4 currently use Bluetooth 6.0, and neither is available in the UK.The first Bluetooth 6.0 headphones have also launched. The Edifier Doo Ace (pictured) is a cheap pair that is super light, but available only in China. They also lack the aptX, LDAC and LC3 codecs the last of this being particularly surprising, seeing as it's part of Bluetooth LE.We should see some devices rocking Bluetooth 6.0 on these shores very soon though, as the next section will show...Which phones are expected to use Bluetooth 6.0?All of the big phones expected to launch from now are expected to come with Bluetooth 6.0 as standard.These include this year's iPhone 17, Google Pixel 10 and Xiaomi 16. The Samsung Galaxy S26 is also expected to support it, though it's not expected to launch until 2026.MORE:Bluetooth Multipoint: what is it? What devices use it?Bluetooth LE Audio: what is the next-gen standard?See the best Bluetooth speakersNow read up on aptX HD Bluetooth: What is it? What devices and headphones support it?The latest hi-fi, home cinema and tech news, reviews, buying advice and deals, direct to your inbox.The word Bluetooth has become synonymous with easy and convenient short-range wireless communications used daily by countless people on planet Earth and in space.Bluetooth is not difficult to use. It is enough to activate the Bluetooth function on two or more devices in a regular way. With the detected equipment within the range, you can connect via a wireless interface and use its capabilities as you wish. The nuance is important: the transmitter and receiver are nearby or the receiver is located in the next room at a distance, as a rule, up to hund