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When developers Android apps, you can use your knowledge of available networks to improve the user experience. Here's how to acquire the necessary network information. Content and app developers continue to find new ways for users to consume and share content on their devices. This drives higher mobile data usage, and can sometimes cause unexpected costs for consumers. Well-made apps can use the built-in Android capabilities to know when mobile data is available and to help the users manage their data use. Access network information with these permissions In order to access information about available networks, an Android app must declare the ACCESS_NETWORK_STATE permission in the manifest. This isn't typically a problem for Android apps that are monetized with ads; in order to retrieve the ads or any other network data, an app already needs to request the INTERNET permission. At a minimum, apps that use the network and detect available networks will need to request the following permissions: Detect any available network Android devices can detect the available networks, such as Wi-Fi and mobile data, from the carrier. In some instances, you may want to check for any available network. I have one app that uses such a small amount of data that I'm not worried about the amount of data, but I am concerned about the effect on the user experience when the app attempts to access data and times out. The following code uses the ConnectivityManager to check all networks, and returns true if any of them are available. If no network is available, your app may wish to delay or cancel a network operation. import android.net.ConnectivityManager; public static boolean isAnyNetworkAvailable(final Context context) { boolean status = false; final ConnectivityManager connManager = (ConnectivityManager)context.getSystemService(Context.CONNECTIVITY_SERVICE); if(null != connManager) { NetworkInfo[] allNetworks = connManager.getAllNetworkInfo(); if(null != allNetworks) { for(NetworkInfo info: allNetworks) { if (info.getState() == NetworkInfo.State.CONNECTED) { status = true; break; } } } } return status; } Despite the rapid increase in speed for mobile (carrier) networks over the last few years, many users are still charged for the amount of data they use. On the other hand, data use over Wi-Fi networks may be faster and have no such usage charges. For this reason some apps (such as the app for Google Play) can delay high-bandwidth operations like downloading apps until you are connected to a Wi-Fi network, which in many cases will not incur usage charges. You can employ this same technique in your apps. With the above code example, there are a few ways you can get more information about the active network. To determine if the active data network is metered (which is a sign that users may be charged for data use), use ConnectivityManager.isActiveNetworkMetered(). Or, to explicitly determine if the active network is Wi-Fi, use NetworkInfo.getType() to check if the connected network is Wi-Fi; if it is, the enumerated type will be TYPE_WIFI. Since each app may require a different strategy to appropriately query and make use of mobile data networks, dig into ConnectivityManager to see what features you need to use. Be well behaved Mobile devices are increasingly hosting "always-on" apps that send and receive data all the time without this being immediately obvious to users. Well-behaved apps should respect a user's desire to limit or control data use over the mobile (carrier) network, and use knowledge of available networks to improve the user experience. Microsoft has launched cloud gaming for Xbox Game Pass Ultimate, bringing remote game streaming to Android devices. The mobile-first rollout takes full-fledged Xbox One titles beyond the living room, further expanding its vision to bring the gaming ecosystem to devices of all shapes and sizes. The technology, formerly known under its Project xCloud codename, now comes included with its Xbox Game Pass Ultimate subscription, extending its value beyond its Xbox and PC roots.Xbox Game Pass leverages Microsoft's cloud data centers for remote streaming, with server blades running your game in the background, before broadcasting your phone with ultra-low latency. That comes with set internet requirements over WiFi and cellular data to ensure smooth gameplay while away from your console. We've rounded up what you need to know about Xbox cloud gaming internet requirements and how to best tune your experience at launch.List of Xbox Game Pass cloud gaming internet requirementsSource: Microsoft (Image credit: Source: Microsoft)A stable internet connection is fundamental to experiencing cloud gaming, with multiple variables to consider when ensuring your network meets the demands. The overall speed and stability play crucial roles, with download speed the most important metric for most users. Microsoft recommends up to 10Mbps down for Xbox cloud gaming, which generally aligns with what's needed to stream HD videos, too.To check your connection meets that requirement, it's best to cross-reference that recommendation with your download speeds. Dedicated speed testing websites like Speedtest.net provide your speed with a simple, one-click test, which provides a bearing to understand how your network compares to those demands.Xbox cloud gaming also works over WiFi or mobile data connections. For WiFi, Microsoft recommends using 5GHz wireless, which provides several advantages over 2.4GHz connections. While the implementation varies based on your network, both wireless bands are widely used nowadays, with baked-in dual-band connectivity with many modern routers. The benefits include higher throughput and reduced interference from other 2.4GHz networks, all of which help deliver a more stable cloud gaming experience.Mobile data can also be used for Xbox cloud gaming while on the move. Using an optimal 5G network provides the best experience, although 4G remains capable with the right speeds. WiFi is often preferred, but that's not always a viable solution when outside the house.How much data does Xbox Game Pass for Android use?Source: Daniel Rubino | Windows Central (Image credit: Source: Daniel Rubino | Windows Central)While Microsoft's cloud gaming solution packs some cutting-edge technology, streaming high-resolution video with sub-latency, the data usage shouldn't be a concern for most. Xbox Game Pass for Android debuts with 720p resolution at 60Hz for streaming, providing suitable quality for a compact mobile display, and keeping data usage reasonable for extended use.We previously tested Xbox cloud gaming through its Project xCloud testing phase, monitoring data usage over 15-minute sessions, with Android's integrated data-tracking features. Our gameplay sessions averaged around 590MB over that window, translating to an estimated 5.2Mbps, or 2.36GB per hour. It's an expected result, akin to your everyday HD video stream. YouTube's bitrate estimates put 720p, 60Hz playback around 2GB per hour, only slightly below Xbox streaming.For those wrangling data caps, Xbox Game Pass cloud gaming shouldn't cause concern any more than other video streaming platforms. If you can comfortably watch Netflix movies or YouTube videos, Microsoft game streaming won't be much different.What you need to get started with Xbox cloud gamingMicrosoft has looked to make Xbox cloud gaming easy to get started anywhere, provided you have a high-speed internet connection and an Android device. The Xbox Game Pass app, available via Google Play and Samsung Store, serves as the platform for all game streaming. An Xbox Game Pass Ultimate subscription is required, available for \$15 month, (opens in new tab) which unlocks over 150 games at launch, with more on the way over the months ahead.The service comes with additional requirements beyond your internet, with a device running Android 6.0 or newer. While an Xbox controller is also recommended, using a Bluetooth 4.0 connection, a small pool of titles also have on-screen touch controls. Minecraft Dungeons, Hellblade: Senua's Sacrifice, and Gears 5 are among those early titles, but severely limits your access to the full library. For the other 150+ games, one of the best controllers for Xbox cloud gaming is essential.Any existing Xbox controller pairs wirelessly provided it's the latest generation Bluetooth-compatible revision, introduced in mid-2017. These controllers can be identified via their streamlined plastic body, where the front faceplate surrounds the Xbox controller, rather than split into a standalone black plastic bar. Microsoft also recommends using one of the best Xbox controller clips, which mounts your phone above the gamepad.Xbox Game StreamingMain As smartphones have become more popular, data plans have become more limiting. A lot of people need to keep a close eye on data usage to avoid surprise bills. We'll show you how to do this with Android's built-in tools. All Android devices have a basic set of tools for monitoring data usage. Many devices also allow you to set up usage warnings and limits to help you avoid using too much data. Setting up these tools can help you stay on top of your usage and avoid costly fees. On your Android phone or tablet, swipe down from the top of the screen once or twice and then tap the "Gear" icon to open the "Settings" menu. The location of the "Data Usage" settings varies by device, though the tools are mostly the same. On Samsung Galaxy phones, you'll go to Connections > Data Usage > Mobile Data. For this guide, we're using a Google Pixel phone. Select "Network & Internet" from the top of the "Settings" menu. Tap "Mobile Network." At the top of the screen, you'll see how much data you have used this month. To see which apps are using the most data, tap "App Data Usage." You'll see a graph and a ranked list of apps ordered by data usage. To prevent an app from using mobile data, tap on it. Toggle the switch for "Background Data" off. This will prevent the app from using mobile data when it's in the background. It will still use mobile data if you open the app. The next thing we can do is set up a data warning and limit. Go back to the overview page with your data usage at the top of the screen. Tap "Data Warning & Limit." First, toggle the switch on for "Set Data Warning," Next, select "Data Warning" and type in a number for your data-usage warning. When you reach this number, you will get a warning notification about your usage. Tap "Set" when finished. Lastly, if you want your phone to cut off data usage completely when you reach a limit, toggle the switch for "Set Data Limit." A message will explain that mobile data will be turned off when you reach the limit. Tap "Data Limit" and then enter a number for your data to be cut off. Tap "Set" when finished. That's what you can do with the built-in data usage tools on most Android devices. If that's not enough or your device doesn't have those tools, we recommend a free app called "GlassWire." GlassWire is well-designed, and it has the same tools as mentioned above. Unlike the built-in tools on Android phones and tablets, GlassWire can also show you Wi-Fi usage. It's a nice app if you need to keep a close eye on all data usage.

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