



PATACS Posts

Newsletter of the Potomac Area Technology and Computer Society

February, 2023

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My turn.....

As usual, the time is flying by, but I'm keeping busy and I hope you are too.

What have I been up to? I'm looking back in my calendar to see...since I can barely remember what I did yesterday! 😞 Many years ago I contracted CRS (Can't remember, well, um, *anything*...). My wife and I visited the Midwest in January. We both like winter—well sort of—so we went to St. Paul (yes, Minnesota) to visit family and managed to miss the really cold weather. They greeted us with 12-15" of week-old snow! On the way back, we stopped in to visit our son, daughter-in-law, and grandchildren #2 and #3—*birth order* only). They are in Ann Arbor, MI, this school year, as our daughter-in-law has a fellowship at the University of Michigan.



I've been doing a lot of photo printing. As a photographer, printing is—for me—what photography is all about. I'm trying to finish printing the images I took in 2022. I'm nearly to November (2022), but I'm pretty sure I won't get it done before we leave on an extended trip (more below), which'll put me behind again.

I just finished attending the **Night Photo Summit** (<https://2023.nightphotosummit.com>), which is a weekend Zoom workshop organized by a group called National Parks At Night—photographers who do a lot of work, you guessed it—at night. This one was number three. Number four is already on the calendar—the 1st weekend in February 2024. Aside from the Night Photo Summit, **National Parks At Night** (www.nationalparksatnight.com) offers workshops mostly in the USA on shooting at night. If you're interested in nighttime photography, check 'em out.

What I haven't done much of, since the beginning of the year, is taking pictures. I plan to change that starting tonight when I am planning an outing to Kensington, MD, to try and get some nighttime train pics. (Only two trains in 25 minutes...then wait an hour! 😞)

I mentioned a trip that my wife and I are doing, about the time you get this... we'll be on our way to Italy and the UK. Our daughter, son-in-law, and grandson (#1) are going for two weeks and we're invited. First to Bologna for a week and then Rome for a week. Then the kids will head home, and we'll stop in the UK to see some dear friends that we've been unable to see for the past 3 years, though we've Zoomed a couple of times.

What are you doing these days? I hope you've been attending, either in person or via Zoom, the club **meetings**. Do you have something you'd like to share with us? President (Paul) Howard is desperately seeking presentations. Now's your chance!

Reminder: **February 2023 meeting in Fairfax is Zoom only**. See website for details.

Next printed issue: April 2023

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WI-FI Hotspot and USB Tether

By John Krout, Potomac Area Technology and Computer Society (www.patacs.org)

If you use a **smartphone Wi-Fi hotspot** to provide an internet connection to a single computer, the tether option may provide advantages.

Introduction

Many environments do not provide reliable Wi-Fi or high-speed Wi-Fi. In those environments, some find that the only way to provide internet access for a computer is to enable a smartphone to provide a *Wi-Fi hotspot*.

From the viewpoint of the computer user, that hotspot is just like any Wi-Fi service. The hotspot shows up in the computer’s list of available Wi-Fi services. Connection to the hotspot usually requires a password; you can find that password on the screen of the smartphone.

Any Wi-Fi hotspot does face issues affecting its performance.

First, the use of the Wi-Fi hotspot drains the smartphone’s battery at an increased rate.

Second, the smartphone’s Wi-Fi hotspot offers no competition to a Wi-Fi router. A router typically has two or more antennae and supplies much greater Wi-Fi signal power than a smartphone’s Wi-Fi hotspot.

Since a smartphone's Wi-Fi signal is weaker than a router's signal, the distance between the smartphone hotspot and the computer is critical. Put the phone as close as possible to the computer. Move the smartphone a bit farther away, and the speed to the computer declines.

Third, due to the weak Wi-Fi signal from a smartphone, the Wi-Fi signal strength and therefore the internet speeds may vary because of intermittent nearby interference beyond anyone’s control.

In short, *tether options* overcome those three issues.

If your smartphone already enables you to create a Wi-Fi hotspot, then your smartphone likely provides one or more options to use a *tether*.

Bluetooth tether

Both recent iPhones and recent Android phones also include Bluetooth tethering capability. Since Bluetooth involves no cable, the capability is better described as a *Bluetooth hotspot*.

Again, like Wi-Fi hotspots, your carrier contract may or may not allow you to use Bluetooth tethering. Also, like Wi-Fi hotspots, Bluetooth has disadvantages. Bluetooth usage accelerates smartphone battery drainage. Also, the Bluetooth range for useful internet data rates is quite limited and degrades over distance.

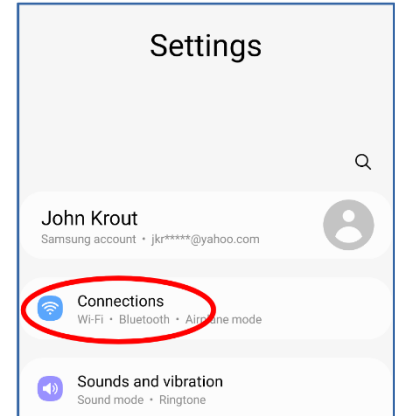


Illustration 1

USB Tether advantages

USB tether simply means that the smartphone provides internet service to the computer through a USB cable. Windows 10 and 11 automatically recognize that the USB tether provides an internet connection.

The USB cable connection provides power from the computer to the smartphone, reducing smartphone battery drainage. USB cable communication requires less power than Wi-Fi or Bluetooth, also reducing battery drainage.

How to enable an Android phone's USB Tether

First, attach the smartphone to a USB cable, and then attach that USB cable to a USB-A socket on a computer. Most recent smartphones support USB3, so plug that cable into a USB3 socket on the computer.

After that, you use **Settings** on your smartphone to enable the USB Tether behavior.

Here is how to enable USB Tethering on a Samsung Galaxy S10 smartphone running Android 12. The main **Settings** app screen, shown in **Illustration 1**, is the place to start. On that screen, tap **Connections**, which is circled in the illustration.

In **Illustration 2**, you can see the **Connections** screen. On that screen, tap **Mobile hotspot and Tethering**, which is circled in the illustration.

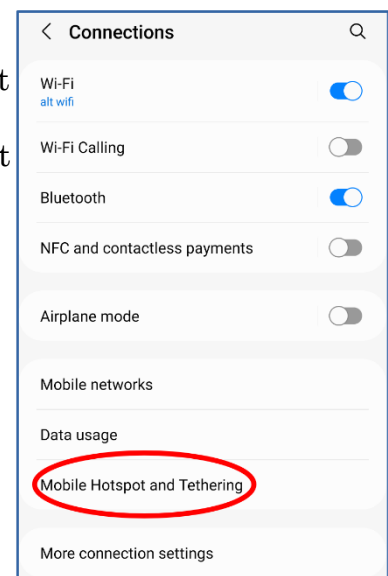


Illustration 2

In **Illustration 3** (below), you can see the **Mobile hotspot and Tethering** screen. As shown, the **USB Tethering switch** is disabled. If a USB cable connects your smartphone and the computer, then that **USB Tethering switch** will be enabled, like the **Mobile hotspot switch** in the illustration is enabled.

After connecting the USB cable to the smartphone and the computer, tap the enabled **USB Tethering switch** to turn on the switch.

When you do so, the computer should recognize the available internet connection via the connected USB cable within a few seconds.

How to enable an iPhone's USB Tether

On an iPhone X, running iOS 15, the equivalent Settings screen sequence to turn on a hotspot are **Settings**→**Cellular**→**Personal hotspot**. My iPhone is not currently on a carrier contract. Therefore, I cannot enable and test an iPhone personal hotspot.

The iPhone user's manual eBook on my iPhone does not document a USB tether capability. USB tether documentation at this iPhone support web page seems to indicate that a USB tether connecting an iPhone running iOS 15 to a computer can be accomplished without turning on any Settings switch: support.apple.com/en-us/HT204023

Ethernet tether

You might think your smartphone cannot connect to an Ethernet cable! But maybe it can, though you have to spend some money to do it.

As you can see in **Illustration 3**, my Samsung Galaxy S10 phone supports an Ethernet tether. To use that Ethernet tether, a smartphone must support **On-The-Go (OTG)** capability. The existence of that **Settings Ethernet Tether** switch may indicate that OTG is supported. I happen to know by testing my S10 phone that the phone does support OTG. To use **OTG with Ethernet**, you must obtain both a 3-way **OTG** adapter and a *USB-to-Ethernet* adapter. With the **OTG** connected to the phone, to power, and the USB side of the *USB-to-Ethernet* adapter, and an Ethernet cable connected to the Ethernet adapter and a computer, the **Ethernet Tether switch** will be enabled.

Most of us already have the USB cable for a USB tether, so the USB Tether method is essentially both simpler and cost-free compared to Ethernet Tether. I suspect that the USB Tether method will be preferable for most readers of this article.

Final Notes

A smartphone hotspot or tether will **never be any faster than the available speed provided by the nearest cell tower**. The very nature of cell towers means that factors beyond the control of any individual will cause download and upload speeds to vary. I have measured the 4G download speed from the cell tower about 2 blocks away from my home a few times. The speed has been as high as 12 megabits per second and as low as 1.8 megabits per second.

Carrier companies claim that 5G will improve the speeds, but there are still caveats: 5G runs at speeds greater than 4G only if you are close to a 5G-compatible cell tower. Also, for

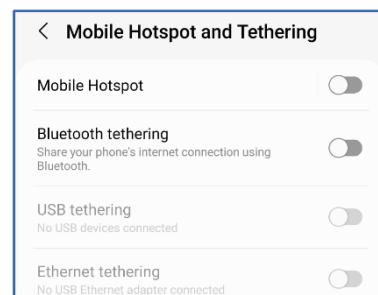


Illustration 3

maximum speed, the cell tower must not be overloaded. That condition is beyond the control of anyone other than the carrier company. The carrier companies are marketing 5G hotspots to businesses to use as an alternative to wired Internet connections. If that marketing succeeds, then 5G-compatible cell tower overloading just may become the new 5G normal in cell towers serving both residential and commercial customers.

John Krout has been writing about the creative uses of personal computers since the early 1980s. He is a now-retired software engineer and writes about technology in general but specializes in smartphones, tablets, and digital cameras. He is a member of the APCUG Speakers Bureau.

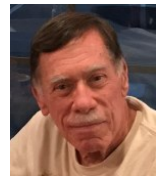
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Cheaper to Buy than Build?

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Many experts suggest you replace a computer about every six years. Usually, by the time a computer is six years old, it is nearing the end of its useful life or at least is in danger of becoming unreliable. At some point in our relationship with any computer, the machine will slow and begin to test our patience. Unfortunately, users will often tolerate a system's sluggishness for far too long rather than deal with the hassle of setting up a new computer, even if they can reasonably afford a new system.



Users who like to stay on the bleeding edge of hardware technology will replace their systems every couple of years, but many do not believe in paying up to have the latest and greatest hardware. For most users, the "sweet spot" is hardware that has been out for at least a couple of years. After that, the price has usually dropped substantially, and any bugs have usually been discovered and worked out.

Since I use my computer for Virtual Reality gaming (for the grandkids, of course) and I like a fast computer, I tend to "overbuild." As a result, I invest in hardware well above the minimum recommended specifications for my operating system, which has always been the latest version of Windows.

Better hardware should support a computer life span well above six years, possibly with some upgrades along the way. But no matter what, I usually notice some performance degradation before six years. "Not responding" notifications not caused by program bugs but by a lack of system resources will start to appear, and the computer will lose the snappy responsiveness that a good system should deliver.



So, it was time to replace my six-year-old computer. Since 2001 I have enjoyed building my computer system from scratch. Building from scratch or “rolling your own” in the language of computer geeks, allows you to select each component individually and avoid the no-name components used by many computers assembled for the general market. Third-party computer builders and sellers such as HP or Dell often use name-brand components for key items such as the CPU, at least in part for advertising purposes, but then skimp on other vital parts such as the motherboard and power supply (PSU). This results in a computer that might appear to have decent specs but will be barely adequate in the future and likely not be upgradeable.

In addition to having a faster, more reliable, longer-lived computer, I have saved substantial money by building it myself. But in 2022, the new computer landscape has changed. Buying a computer assembled by at least one manufacturer, Cyber Power resulted in an excellent system that saved me about \$300, or about 30%, compared to buying the individual components and assembling a system. Plus, it was a lot less work both shopping and assembling! In addition, I found that Cyber Power used individual quality components, most of which I would have chosen myself. Of course, other third-party builders also offer a similar advantage today, but Cyber Power offered the most dramatic savings.

This is the pre-built system I bought:



CYBERPOWERPC Gamer Xtreme VR Gaming PC, Intel Core i5-11400F 2.6GHz, 8GB DDR4, GeForce RTX 2060 6GB, 500GB NVMe SSD, WiFi Ready & Win 11 Home (GXiVR8060A11)

[Visit the CyberpowerPC Store](#)

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(Editor's note: the price has changed since the article was written.)

This is my analysis of the cost of buying each component individually:

• Intel Core i5-11400F 2.6GHz	\$170
• 8GB DDR4 RAM	\$ 30
• GeForce RTX 2060 6GB video card	\$620
• 500GB NVMe SSD,	\$70
• Gigabyte b560 ds3h ac MB	\$120
• 600 W PSU	\$ 60
• Windows 11 Home	\$130
• Case	\$80
• Total	\$1280

I shopped around for the components and attempted to find the best price for each one. I did not include sales tax or shipping for the pre-built system or the components.

My only issue with the pre-built system is the RAM; 8 GB of memory is just standard in 2022. Today 16 GB, 24 GB, and even 32 GB of RAM is what you would expect on a more powerful, somewhat future-proof computer. Fortunately, my old system has 16 GB of decent RAM, so I can beef up the RAM to 24 GB at no additional cost. (Editor's note: that assumes the RAM is of the correct spec which is not noted here.)

Conclusion

It is possible to buy a quality pre-built computer for the first time in memory, for substantially less money and trouble than buying and assembling a system yourself. Some of this might result from supply chain issues, including video card availability and pricing. Today video cards are necessary for mining cryptocurrencies and other developing applications such as self-driving cars and other forms of Artificial Intelligence so that the demand will continue into the foreseeable future.

Images were copied from Google and Amazon by the author.

###

Android Apps on Windows 11 – Well, I'll be!

By Phil Sorrentino, Secretary, and APCUG Rep,
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<https://sccccomputerclub.org/>

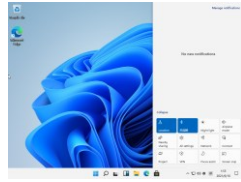
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Many apps that run on Android smartphones and tablets may soon be running on Windows 11 machines. As of February 2022, only in the US are Android apps available for Windows. A new addition to Windows 11, "Windows Subsystem for Android," will enable your Windows 11 device to run Android applications that are available in the

Amazon App store. That may sound a bit confusing since apps for Windows usually come from the Microsoft store. Be that as it may, this feature may eventually prove useful.



on



If your computer meets the requirements for Windows 11, it meets the requirements for Android apps. (Make sure to check for any Windows 11 updates, and install them before proceeding with Android apps.) Additionally, Windows 11 must have hardware virtualization enabled. Windows 11 runs Android in a virtual machine, which is why this is necessary. (A virtual machine is a computer *file*, typically called an image, that *behaves* like an actual computer. It can run in a window as a separate computing environment, often to run a different operating system—or even to function as the user's entire computer experience—as is common on many people's work computers.)

To check if your computer has virtualization enabled, go to the “**Performance**” tab in Task Manager (Ctrl+Shift+Esc). Open Task Manager, and click “More details” if you don't see the Performance information. If virtualization is not enabled for a computer using an Intel CPU, you can enable Intel VT-X in your computer's UEFI firmware (BIOS). If your system uses an AMD CPU, look for AMD-V in the UEFI firmware settings.)

If you are part of the Windows Insider Program, you may have already experienced Android apps for those more technically inclined. So far, the Windows Insider Program has been testing the capability with fifty or so popular Android apps. Eventually, you will see the “mobile” apps in the “new” Microsoft store, though currently, the download will come from the Amazon App store. Articles in the literature indicate that once downloaded, you can run these apps side-by-side with the help of the new Snap Layouts feature of Windows 11. And you'll be able to pin them to your Start menu or Taskbar and interact with them via a mouse, a touch screen, or an input pen. Also, you will be able to share your clipboard between Windows and Android apps, and you will be able to see notifications from Android apps in the Windows Notification Center, which sounds like a pretty comprehensive integration into the Windows 11 environment. Why would you need a mobile app when you have plenty of apps on your desktop computer? Well, there may be some mobile apps that don't have a desktop equivalent. Early results of the Windows Insider Program highlighted a few areas that may be interesting, such as Games, Reading books with Kindle, and content for kids, such as teaching math, reading, and writing skills. The Windows Insider Program encourages developers and creators to develop apps for this new Windows 11 environment.

For those of you who would “lean in” to a technical discussion, this paragraph is for you; others might want to skip this paragraph. Just a little “techno-talk,” Windows 11 will soon be enhanced by adding a new component. This new component will be a subsystem that will essentially ride on top of Windows 11 and will be called the “Windows Subsystem for Android.” The subsystem will include the Linux kernel and an Android OS based on the Android Open Source Project version 11. It will be distributed through the Microsoft Store as part of the Amazon App store installation, allowing users to stay updated over time as the software evolves. The subsystem runs in a Hyper-V virtual machine, allowing multiple operating systems to run simultaneously. End of “techno-talk”. Suffice it to say it will be a relatively sophisticated and complex software product.

For example, one of the icons for Android on Windows looks like this:



So, for those who might be more adventurous, how do you install Android apps on a Windows 11 computer? As always, there are YouTube videos on the subject which would be an excellent first step. After the videos, the first thing to do is open the Microsoft Store on your computer. Click the start button, find the Microsoft Store in the alphabetical Start Menu list, and click it to open it. In the App Store, search for “Amazon App Store”. If the Amazon App Store is not installed, you will have to install it. (Note that this could take a while. A pop-up will appear and guide you through the process; click “Set up” and continue through the steps down to the App Store installation. The last thing to do will be a computer restart. After the restart, the Amazon App Store will automatically open. If it doesn’t, you should find it in the Start Menu.) When installed, the first thing to do is to sign into your Amazon account if you have one. If you don’t have an Amazon account, you can create one at this point. Once you are in the Amazon App Store, you will see that it works like all the other app stores you have used. (When I first installed the Amazon App Store, I didn’t find any app that I needed, but that was expected because, at that time, there was a limited number of apps available, though we are told that many apps are soon to come.) In the store, you will find free and not-free apps. The free apps will have a “Get” button; the not-free apps will have a button with a price. Navigate to an app you want and click the appropriate button. Click Install and the app will download and then install. You can click “Open” to use the app when the installation is finished.

If you followed the directions and everything worked out, you have just installed your first Android app on a Windows device. The Android apps you downloaded can now be found in the Start Menu, just like Windows apps. They can even be pinned to the Taskbar like regular Windows apps. But what about Android apps that are unavailable in the Amazon App Store? Well, you can always “sideload” apps, but that’s a subject for another time.

###

Gave Up My Mouse Long Ago and I'm Happy I Did

By Kurt Jefferson, Editor, CKCS Newsletter <https://ckcs.org/>

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If You Hate Your Mouse, Try a Trackball Instead...



The article in [Gizmodo](https://gizmodo.com) (gizmodo.com) doesn't mince words with the headline: "With its big roly-poly ball and huge hand rest, the venerable trackball mouse looks like a holdover from 1996. Or maybe 1946 – that's the first time a trackball was used as an input device in a computer," writes Alex Cranz in her 2017 article.

She asserts the waning popularity of the lowly trackball after more of us began using the mouse and then the trackpad. Cranz adds, "But here's the thing: The trackball is still good. Not just good—the trackball is great. So great that Logitech is introducing its

first trackball in many years is a cause for celebration—even if I have some issues with my new favorite input device."

So, in 2017, Switzerland-based Logitech introduced its first new trackball in years. Guess what? The MX Ergo was a major hit. And sales are still climbing. Last fall, Logitech reported a 26% increase in mice and trackball sales. (Logitech sells plenty of mice – but it's also discovering many people insist on trackballs instead.)

Then, last October, Logitech introduced yet another trackball: the Ergo M575. The user can connect to a desktop, laptop, Mac, or PC via a USB interface with a small transceiver or Bluetooth. It will also connect to an iPad using the Bluetooth option.

As more of us began working and teaching school from home in 2020 because of the pandemic, more of us are actively ditching our mice. (Plenty of us are still working and teaching from home via Zoom and other software.)

Make Tech Easier [explains](#) why trackballs are better for you: "More workers are aware of the health risks and problems associated with long periods of sitting daily. It's supremely unhealthy, and many companies have made a serious effort to help modern office workers reduce the risks of desk-bound work.

"While standing up will help your health, more ergonomic input devices can protect you from a repetitive strain injury (RSI).

“These injuries are caused by repeatedly straining your body in the same way, over and over again. These injuries can cause numbness, tingling, and pain, and they won’t go away until you stop the stressor.

“Trackball mice can be a blessing for workers suffering from a wrist-based RSI or carpal tunnel. The benefit comes from the trackball’s stable position. While you move your wrist and arm to manipulate a traditional mouse, you only need to move your fingers to use a trackball. If you use a wrist rest with your trackball, your wrist will be at a healthier angle. This frees it from the strain associated with sliding your mouse around. Because your hand stays in one place, your arm and wrist won’t be strained by the constant back-and-forth movement of a mouse.”

As *Popular Mechanics* [wrote](#) in June, “A trackball mouse is a great way to make endless mouse movement less strenuous.” It’s proven that trackballs reduce wrist stress and grip fatigue.

While the best-selling Logitech trackballs are thumb-operated, Kensington, which might be called the “king of trackballs,” sells at least seven trackballs on its website, and Amazon, Newegg, and other online sellers.

Because of growing demand, Kensington has released several new trackballs in recent years, including the:

- Expert Mouse Wireless Trackball
- Pro Fit® Ergo Vertical Wireless Trackball (White & Black)
- Orbit® Fusion Wireless Trackball
- Wired Orbit® Trackball with Scroll Ring
- Orbit® Optical Trackball.

The popular Expert Mouse Wireless Trackball often tops the ratings when reviewers put trackballs through their paces. The [Wirecutter](#) (a review website purchased by The New York Times), trackballmouse.org, gadgetreviews.com, and [iMore](#) all praise that finger-operated device.

A Japanese trackball maker, Elecom, has also earned a steady but growing market share in the US. Elecom currently makes the only trackball especially designed for left-handed users. It’s the Elecom M–XT4DRBK model. (Read about it here at amazon.com).

Popular Mechanic’s [website](#) tells what to look for as you decide whether or not to opt for the benefits of a trackball.

###

Talk, Texts, Data – How much, and for how much?

By Phil Sorrentino

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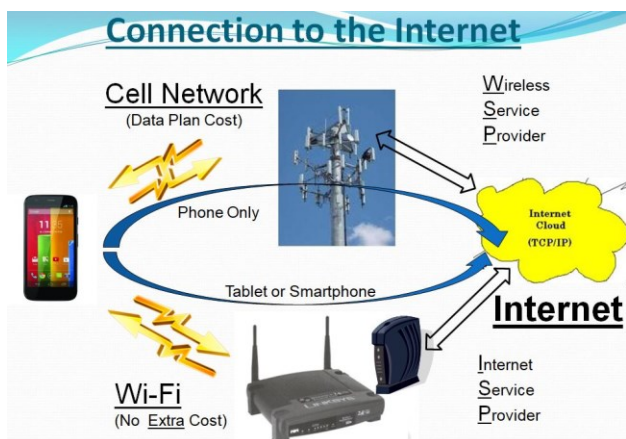
As you probably know by now, along with a smartphone comes a phone plan. This plan defines how you will be charged, by your wireless provider, for using your phone. Some of the more popular wireless providers are AT&T, Verizon, & T-Mobile, because those three companies own the three major wireless networks in this country. In addition to those three, there are resellers like Consumer Cellular, Mint Mobile, Ting, and Boost Mobile. (A reseller is an organization that sells wireless services under its name but uses the networks of other service providers. For example, Ting uses T-Mobile.) If you have a “completely unlimited” plan, that is, no limits on the number of talk minutes, texts, and especially data, the rest of this article is just academic because you pay one price no matter how or how much you use your phone, but if you don’t have a completely unlimited plan, this may be interesting. Many plans that sound like (completely) unlimited plans are unlimited talk and text with typically a very large **data** allotment, but not completely unlimited data. (A completely unlimited plan for a single phone may be around \$70/month, but less if you have multiple lines. For example, I have seen an unlimited plan advertised as \$37.50/month each for two lines; that’s \$75/month for two unlimited lines.)

“**Talk**” time is the number of minutes you can use your phone for voice cellular phone calls. This would be the time you spend on your phone talking to people who are using smartphones, flip phones, or even home phones. Phone calls are from phone to phone, so you need a phone number for the phone call recipient. Phone calls typically go via the cellular phone network (cell phone towers), though you may be able to use wi-fi calling under certain conditions. **Talk** minutes are relatively inexpensive; they are almost free with most plans. If you want a plan with only **talk** minutes, they can currently be had for around \$20/month with unlimited minutes or about \$15/month with around 250 minutes. **Talk** used to be the whole reason for having and using a phone, but now there are many more uses for the smartphone.

“**Texts**” is the number of typically short typed-in messages that are sent immediately to the phone number you have chosen from your contact list. **Texts** (text messages) can only be sent from one cell phone to another, so you need a cell phone number to be the recipient of the **text** message. (Smartphone, Flip phone, probably not a home phone.) **Texts** typically go via the cellular phone network (cell phone towers) but can go via wi-fi if you are in the vicinity of a wi-fi router. (Note: data is used for attachments to **texts**.) **Texts** have become a fairly common way to keep in touch with people because of their instant messaging nature. A **text** is immediately sent to the recipient, giving them the message and the ability to answer immediately or at a future time.

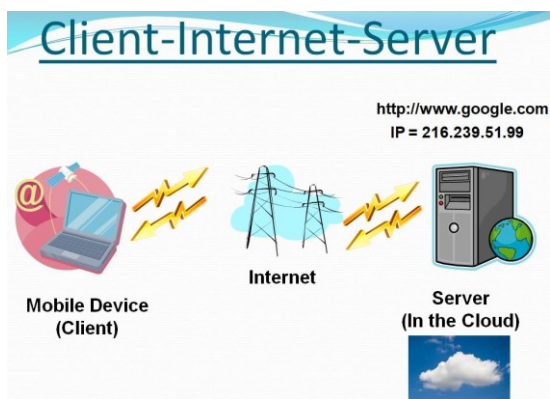
“**Data**” is the amount of data that is transmitted over the cellular phone network (cell phone towers). **Data** allotments typically come in GigaByte (GB) or half GigaByte increments (some may even be in hundreds of MegaBytes (MB)). **Data** allotments may be on a per-line basis, or with some plans, the **data** can be shared among a group of phones in a so-called family plan. When you are out and about, even traveling in your car, all the **data** transmitted to and from your phone is charged against your monthly **data** allotment. Fortunately, when you are not out and about and you are in the

vicinity of a wi-fi router, the **data** that gets transmitted is not charged against your monthly **data** allotment. (You have already paid the internet service provider for the use of the wi-fi as part of your monthly internet bill.)



Data may be transmitted from your phone by any widget or open app. (Keep in mind that widgets are open as long as your phone is not powered off. Fortunately, most widgets use very little data.) Many apps need a constant flow of data to keep their information current; maps and Waze are two apps that come to mind. All of the apps on your phone are designed to be the client in the client-server computing model. These apps can only do their job when connected to their server. (The internet provides the connection via cell

phone towers or wi-fi.)



If an app is not closed after it is used, it may still be transmitting **data** to, and receiving **data** from its server, even if you are not looking at one of its screens. So, if you don't have an unlimited plan, make sure you close any app you will not use. If you don't want to use any **data** at a given time, most phones can turn off the **data**, typically in "Settings." Make sure you leave yourself a reminder to turn the **data** back on afterward. (With the **data** turned off, you will still be able to

make and receive voice calls and probably **texts**, though you will probably not be able to receive attachments, like pictures, to **texts**.) **Data** is really what makes the smartphone so useful and versatile. **Data** makes the smartphone a personal digital assistant with endless uses, gives you access to enormous databases and provides answers almost instantaneously.

As you can see from the amount of information describing **talk**, **texts**, and **data**, the emphasis is on **data**. The cost of most plans is directly correlated to the amount of **data**; it almost seems that **talk** and **texts** are just about thrown in at no extra charge. It is the fact that your smartphone can interact with a much more capable server at the other end of the internet that gives your smartphone all of its various amazing capabilities. It is **data** that lets us check our email, consult our calendar, find the nearest Japanese restaurant, keep in touch with people, and research and purchase items on Amazon or many other retailers on the internet, all without us moving from the comfort of our homes, offices, or automobiles.

And last:

I have run out of articles that will fit on the last page, so I'll stick in this photograph, which I took just before sunrise on October 22, 2022, in Mt. Vernon, IA.

Equipment:

Canon R5,
1.3s, f/11,
ISO 200,
77mm, **RF**
24-105mm
f/4 L IS
USM, and a
Gitzo tripod.

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Meeting schedule (Zoom=Online Only, Hybrid=Online/In-person)

1 st Wednesday	7:00 - 9 PM	Arlington General Meeting	Hybrid
3 rd Monday	7:00 - 9 PM	Board of Directors Meeting	Zoom
3 rd Saturday	12:45 - 3:30 PM	Fairfax General Meeting	Hybrid
4 th Wednesday	7:00 - 9 PM	Technology & PC Help Desk	Hybrid
Arlington Meet: 5711 S. 4 th ST., Arl. VA		Fairfax Meet: 4210 Roberts RD., Fairfax, VA	

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