

Conversational Unified Communications



Learn about:

- The role that the PBX plays in corporate phone systems
- What the SIP protocol is used for
- The difference between network based providers and over the top providers

By **Brien M. Posey**

(Microsoft MVP, Commercial Scientist-Astronaut Candidate)

Sponsored by

Spectrum
ENTERPRISE

Sponsored by Spectrum Enterprise

Spectrum Enterprise, a part of Charter Communications, Inc., is a national provider of scalable, fiber technology solutions serving America's largest businesses and communications service providers. The broad Spectrum Enterprise portfolio includes networking and managed services solutions: Internet access, Ethernet access and networks, Voice and TV solutions. Spectrum Enterprise's industry-leading team of experts works closely with clients to achieve greater business success by providing solutions designed to meet their evolving needs.

More information about
Spectrum Enterprise can be found at

enterprise.spectrum.com



Conversational Unified Communications

by Brien M. Posey

© 2019 Conversational Geek



Conversational Unified Communications

Published by Conversational Geek® Inc.

www.conversationageek.com

All rights reserved. No part of this book shall be reproduced, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without written permission from the publisher. No patent liability is assumed with respect to the use of the information contained herein. Although every precaution has been taken in the preparation of this book, the publisher and author assume no responsibility for errors or omissions. Nor is any liability assumed for damages resulting from the use of the information contained herein.

Trademarks

Conversational Geek, the Conversational Geek logo and J. the Geek are trademarks of Conversational Geek®. All terms mentioned in this book that are known to be trademarks or service marks have been appropriately capitalized. We cannot attest to the accuracy of this information. Use of a term in this book should not be regarded as affecting the validity of any trademark or service mark.

Warning and Disclaimer

Every effort has been made to make this book as complete and as accurate as possible, but no warranty or fitness is implied. The information provided is on an “as is” basis. The author and the publisher shall have neither liability nor responsibility to any person or entity with respect to any loss or damages arising from the information contained in this book or programs accompanying it.

Additional Information

For general information on our other products and services, or how to create a custom Conversational Geek book for your business or organization, please visit our website at ConversationalGeek.com.

Publisher Acknowledgments

All of the folks responsible for the creation of this book:

Author:	Brien M. Posey
Project Editor:	Emily Downs
Copy Editor:	Steven Zimmerman
Content Reviewer:	J. Peter Bruzze

Note from the Author

Hello, greetings, and welcome to Conversational Unified Communications. I'm Brien Posey. For those of you who don't know me, I am a long time Conversational Geek author, and 17-time Microsoft MVP. My professional background is in both IT and in commercial astronautics. It's an odd combination for sure. I sometimes find myself setting up virtual machines on one day, and being strapped into a space capsule the next day (seriously). Thankfully, Peter, Nick, and the rest of the folks at Conversational Geek have embraced my unorthodox (dare I say eccentric) career choices and have allowed me to author books on subjects ranging from the cloud computing to real life rocket science. I would like to personally invite you to go to ConversationalGeek.com and check out some of these other books.

In this book, I want to talk about unified communications. Those of you who follow my work may recall that back in 2009 I wrote another book about unified communications called *Brien Posey's Guide to Practical Telecommuting* (<http://brienposey.com/book/brien-poseys-guide-to-practical-telecommuting-self-published-2009>). That book was nearly 700 pages – and that's the problem. Unified communications systems are complicated – more so than most people realize.

Phone systems use hardware, software, and protocols that are completely different from those used in general purpose IT networking. The first time that I ever had to program a phone switch, I felt completely lost in spite of having years of IT experience under my belt. As if telephony were not complex enough, creating a unified communications system means deploying additional protocols, which are required to bridge the communications gap between telephony systems and IT systems.

My goal in writing this book is to simplify the world of unified communications and take a vendor neutral approach to the subjects of telephony and unified communications. While this book won't make you a unified communications expert, you will learn some of the basics and how you can greatly simplify things by leveraging the cloud. It should be a lot of fun.

Enjoy!
Brien M. Posey



The “Conversational” Method

We have two objectives when we create a “Conversational” book: First, to make sure it’s written in a conversational tone so that it’s fun and easy to read. Second, to make sure you, the reader, can immediately take what you read and include it in your own conversations (personal or business-focused) with confidence.

These books are meant to increase your understanding of the subject. Terminology, conceptual ideas, trends in the market, and even fringe subject matter are brought together to ensure you can engage your customer, team, co-worker, friend and even the know-it-all Best Buy geek on a level playing field.

“Geek in the Mirror” Boxes

We infuse humor into our books through both cartoons and light banter from the author. When you see one of these boxes it’s the author stepping outside the dialog to speak directly to you. It might be an anecdote, it might be a personal experience or gut reaction and analysis, it might just be a sarcastic quip, but these “geek in the mirror” boxes are not to be skipped.



Within these boxes I can share just about anything on the subject at hand. Read ‘em!

Why Does Unified Communications Matter?



It never ceases to amaze me just how much computing power all of us are carrying around in our smart phones. The average smart phone has thousands of times more computing power than the computers that sent the Apollo 11 astronauts to the moon! Besides being able to run all sorts of cool apps, there is something else that our phones can do. They can be used to make or receive phone calls. With all of the other things that we use our smartphones for, it is easy to forget that those devices are first and foremost telephones.

While it is fun to compare our smartphones to the technology that got us to the moon, there is a much more important point that I only briefly touched on in the previous paragraph. A

smartphone is above all else, a phone. The reason why this is such an important point is because in business the phone is still one of the most dominant (if not the most dominant) forms of communications. Sure, the phone has evolved a lot since Alexander Graham Bell first patented the device in 1876, but we still use the phone in much the same way as it was used over a hundred years ago.



It is really incredible that the moon missions were able to succeed given the modest amounts of computing power that were available at the time. If you have ever been curious about the software that got us to the moon, it's now available on GitHub:

<https://github.com/chrislgarry/Apollo-11/>

The bottom line is that every business needs a phone system. Employees need to be able to pick up the phone and make a call when the need arises. They also need to be able to receive calls from customers. It has been this way for decades.

Although the phone has been used in more or less the same way for what seems like forever, there are some things that have changed. I'm not just talking about the not-so-subtle differences between my grandparents' old rotary phone and the smartphone that's in my pocket right now, but rather about the ways in which technology has changed the way that people work.

Not all that long ago, the corporate workday ended at around 5 o'clock in the afternoon. If you tried to call somebody at the office after that time, there is a good chance that the call would go to voicemail. Today however, the lines have been blurred between work and personal time. The workday no longer ends at 5 o'clock. If you attempt to call someone on their business line after hours, there is a good chance that the call is going to be forwarded to the recipient's mobile number,

and be answered. Most people no longer have the luxury of ignoring the phone after 5 o'clock.

A legacy business phone system would typically require an employee to manually forward their phone when they leave the office for the day. In contrast, a good unified communications platform can automatically route calls based on a series of rules. Some of these systems can even display presence information that convey an employee's availability.

Another thing that has changed is the medium through which we communicate with one another. If an employee in the 1970s needed to communicate with another employee on the other side of the building, they generally had two choices: to pick up the phone or walk to the employee to meet them face-to-face. It was that simple. In the 1980s, faxes were added to the mix, as were crude first generation electronic mail systems. Today however, we have an entire plethora of communications media ranging from phone to text to email to instant message, and the list goes on and on.

In some ways, it is almost liberating to have so many different forms of communication available to us. At the same time though, there is almost an unspoken expectation that when you attempt to contact someone, that person should be immediately accessible regardless of which communication medium used. In other words, it is possible for users to get bogged down by technology. It's somewhat unrealistic to expect a user to be accessible through every communication medium all the time. Unified communications can help with this by tying various communications platforms together within a common interface.



Even though the sheer number of communication platforms can sometimes feel overwhelming, there is something to be said for having options. I sometimes have to travel outside of the United States for both my spaceflight training and for IT related endeavors. My cell phone doesn't work outside the country, so I enjoy being able to use my laptop to video conference with my wife.

Considerations for the Business

Cell phones first started becoming a thing when I was a kid, growing up in the 80s. Back then, there were no smartphones. Cell phones of the time were as heavy as bricks, and were so ridiculously expensive to use that they became something of a status symbol. Movies of the time depict cell phones being used by stock brokers and the well-to-do.



I got my first cell phone in 1992. The phone weighed several pounds and was known as a bag phone because it was integrated into a small duffel bag. Text messaging did not exist at the time, and my deeply discounted service plan cost \$50 per month, plus \$0.35 per minute of talk time.

At the time, I vividly remember seeing one of those corny investigative reporting shows on TV, in which the host was doing a big expose on cell phones. They showed one guy who was living the good life, using his phone to make business deals from the golf course. Another guy however, was being awoken every few minutes, all night long, by clients on the other side of the world (as if those clients could not have called a land line prior to the guy purchasing a cell phone). At any rate, that

show made a lasting impression on me, because it made me realize that you can use technology to enhance your life or you can become a slave to it.

In the business world, it's extremely important for us to deploy tech in a way that enhances user productivity, rather than getting in their way, or burdening a user with one more platform that they have to keep up with. This means that we must figure out what communications media and capabilities the user needs, and then figure out how to best provide those things to the end user. The idea is to make it easier to run the business by removing technical complexity and platform sprawl where ever possible. This is where unified communications comes into play.

The Basics of Unified Communication

Unified communications is one of those technologies that can be tough to define, but is easy to recognize. Part of the reason why the term unified communications can be tough to define is because early on there was a lot of bickering among vendors, each of whom was trying to redefine the term to suit their own platform, while also excluding the competition. But I digress.

I personally define unified communications in a very loose way. It's the blending together of two or more electronic communications mediums. Let me give you a really simple example. Your smartphone probably supports voice calls, SMS text messages, email, and maybe even instant messaging or video conferencing. As such, that smartphone could be thought of as a unified communications client.

Keep in mind though, that your smartphone is probably aggregating services from a variety of sources. Voice communications and text messages generally come from your wireless provider, while email might be delivered by the company that you work for. The point is your smart phone is acting as a unified communications client, not as a unified

communications platform. A unified communications platform pulls together a variety of communications types and delivers those various means of communication as a collective service.

One of the earliest examples of a unified communication platform was Microsoft Exchange Server 2007. Prior to that particular Exchange Server release, Exchange Server was largely an email platform (although Microsoft did experiment with instant messaging in some of the earlier Exchange Server releases).

The thing that made Exchange Server 2007 different from previous Exchange Server releases was the introduction of what Microsoft called Unified Messaging. By integrating the Exchange Server into an organization's telephony system, it became possible to deliver voice messages by email. If an organization also deployed Microsoft's Office Communications Server, then users could send and receive email, instant messages, and phone calls all through a single software application. The system could even convey presence information, making it possible to tell if the person that a user was about to contact was available, on the phone, or out of the office.

Microsoft Exchange Server 2007 was released well over a decade ago and a lot has changed in that time. Even so, the basic idea behind unified communications really isn't all that different today from what it was back then. Unified communications remains a blending of voice and various forms of data communications - with one important caveat.

One thing that differentiates unified communications today from what we had in the past is application integration. To explain how this works, let me go back to the smart phone analogy that I have been using throughout this book.

Smartphones, as I have said, allow for both voice and data communications. But there is something else that smart

phones do. They run apps. In many cases, these apps are designed to take advantage of the phone's native capabilities. We've all seen third-party navigation apps that utilize a phone's GPS receiver or call blocking apps that intercept unwanted phone calls.

So, with that in mind, consider another app: Facebook. The Facebook app (depending on which mobile operating system you're using) is designed to leverage your smartphone's capabilities. The app can use your phone's GPS location to "check-in" to a place of business, location or event. It also features a Messenger app that you can use to send instant messages to your friends. Perhaps more importantly (at least from the standpoint of this book), the Facebook app integrates into your phone's contact list. This means that your Facebook friends might show up in your list of contacts, thereby giving you an easy way to call or send messages to your friends.

So, think about this from a business standpoint. The Facebook app really isn't all that different from any other app. If the Facebook app can interact with a device's unified communication capabilities, what is to stop other apps from doing the same? The answer is nothing. In fact, a number of different enterprise applications such as Salesforce are able to leverage unified communications capabilities. This means that it is no longer enough to simply consider how your users will communicate with one another. You also have to consider how the underlying communication infrastructure will support your applications.

Anatomy of a Unified Communications System

I don't want to get too deep in the weeds, but I want to spend a little bit of time talking about some of the basic components that make up unified communications systems. It would be impossible to cover unified communications in granular detail within the confines of such a short book, so my goal here is not

to make you a unified communications infrastructure expert, but rather to familiarize you with a few key concepts.

The PBX

The heart and soul of a unified communications deployment is a PBX system. PBX stands for private branch exchange and is the system that routes telephone calls throughout the organization.

Early on, all PBX systems were hardware based, and functioned similarly to a network switch. Just as a network switch routes data packets, a PBX system routes voice calls. The advent of Voice over Internet Protocol or VoIP phones led to the introduction of software-only PBX systems. A software PBX routes phone calls just like a hardware PBX does, but physical ports are unnecessary because VoIP phones do not connect directly to a phone line.



When you set up a PBX system, you have to enter caller ID information for each phone line. The PBX system doesn't care what values you enter, so you can basically enter any identity that you want. This is how some telephone scammers are able to trick their victims into believing that they are speaking to someone from a government agency or a charitable organization. The scammer simply programs a PBX system to spoof the identity of the organization that they want to impersonate.

PBX switches were originally introduced into corporate environments as a way of controlling costs. Imagine for a moment that there are a hundred employees working in an office, and each one of them has a phone on their desk. Assuming that the office is not functioning as a call center, the

odds are really slim that all 100 employees would be calling someone at the same time. It could be that at a given moment, only about 20 employees are on the phone at the same time.



In unified communications, the use of a PBX to connect many clients to a limited number of outside lines is called trunking. The term trunk came about because the structure metaphorically resembles the trunk of a tree.

So given that bit of information, does it really make sense for the company to pay for a hundred phone lines? Of course not. Instead, the company would more likely pay for 20 or 30 phone lines, and connect those lines to a PBX system. The PBX system allows employees to call each other without using an outside line (the call is simply routed through the PBX switch). When an employee does need to place an outside call, the PBX system routes the call over one of the available outside phone lines.



PBX systems are notoriously difficult to configure, but if you want to try your hand at setting up a PBX system, then I recommend the AudioCodes MP-114. These devices, which only cost a few hundred bucks (sometimes less), are scaled down versions of enterprise PBX systems. The MP-114 allows you to connect two analog telephones. You can place calls between the two phones (using internal phone numbers of your own choosing), and you can place calls to the outside world. There are a variety of resources available online that can walk you through the configuration process.

Protocol Support

You really can't discuss the anatomy of unified communications without talking about the Session Initialization Protocol, or SIP as it is usually called. The most important thing to understand about SIP is that it does not provide any services itself. Instead, SIP's job is to create, manage, and terminate sessions. In addition, the SIP protocol is commonly used to convey user location, user availability, and device capability (for example, a particular device might support voice but not video communications) information.

Because the SIP protocol provides session support without providing any actual services, it shouldn't come as any surprise that SIP is only one of several different protocols that are used by unified communications systems.



Some older documentation refers to the Session Description Protocol as the Session Definition Protocol.

SIP is an application layer protocol. However, SIP is not the only application layer protocol that is used by a unified communications system. The exact mixture of protocols varies considerably depending on the setup. Some of the more commonly used protocols include the Real Time Streaming protocol (which streams audio and video) and the Real Time Transport Protocol (which manages bandwidth to ensure that streaming can take place).

The important takeaway from this is that unified communications require a hierarchical mixture of protocols.

How the Cloud Can Help



As I explained in the previous chapter, unified communications is not based on one single technology, but is instead an architectural framework that makes use of a number of different protocols and technologies. Normal IT networking skills really don't translate very well into the world of unified communications. To master unified communications, you need a mixture of IT networking skills and telephony skills. The good news is that there is a way to implement unified communications without having to take the time to learn all of the technical stuff.

The reason why it is possible to shortcut the unified communications learning curve is because unified communications can now be deployed either on premises or in

the cloud. I will be the first to admit that at one time the prospect of moving an organization's most critical communication infrastructure to the cloud was somewhat unnerving. However, the cloud has been around for long enough to have been proven reliable, and there are countless mission critical applications running in the cloud today.

There are several advantages to operating a unified communications platform in the cloud. The most obvious of these advantages is that a cloud hosted solution cuts through all of the complexity. The provider deals with things like configuring the virtual PBX and making sure that firewalls are configured properly. In other words, the cloud provider handles all of the complicated stuff, leaving you to focus on more important things.

Alleviating complexity is not the only benefit to using a cloud-based unified communications platform. Another benefit is the cost model. On premises IT solutions are commonly classified as capital expenditures (CapEx), while hosted solutions are treated as operating expenditures (OpEx). The advantage to the OpEx model is that there is no requirement to spend a bunch of money up front on servers, telephony hardware and other equipment. Instead, you are only paying for the cost of using the system, usually in the form of a per-user subscription fee.

Now before I go on, I want to take a moment to "keep it real". Those of you who follow my work know that I have always been skeptical of the claims that operating in the cloud is the cheap way of doing things. When you purchase server hardware, that hardware is paid in full, and there are no additional costs associated with using that hardware (aside from power, cooling, and that sort of thing). When you run a resource in the cloud, you are essentially leasing hardware. Because you are paying the subscription fee month after month, the cost of operating in the cloud will eventually

exceed the cost of outright purchasing the resources needed to run whatever workload in house.

Having said that, there are some situations in which operating in the cloud makes sense. For example, if you need to run a workload on a temporary basis, it is probably going to be far less expensive to run that workload in the cloud than to run it on premises. Similarly, a compelling case can be made for hosting unified communications in the cloud.

For one thing, hosting your unified communications platform in the cloud frees you from having to train your IT staff in telephony or pay a high priced consultant to set everything up. Telephony is an entirely different animal from traditional IT, and it requires a significant degree of knowledge just to be able to spec and purchase the necessary hardware.



Back in the 90s, I had a PBX system in my house. Back then, you pretty much had to use dial up if you wanted to get online. I had multiple computers in my house, but also had a fax machine, and voice phones. I found that a PBX system gave me the flexibility to dynamically allocate phone lines on an as needed basis. If I wasn't using my fax machine at a given moment for example, then that line could be used instead for voice or Internet communications

The whole system worked really well until lightning struck the telephone pole outside of my house. The surge destroyed my PBX and most of the hardware that was connected to it. It was an expensive loss.

The bigger argument for hosting your unified communications platform in the cloud, however, is that the cloud acts as

something of an insurance policy. If I am to be completely honest with you, I don't have the best history with on-premises phone systems. I have lost more than one PBX to power surges, and I couldn't even begin to tell you how many times I have wrestled with gremlins that suddenly plagued a phone switch that had been working perfectly the day before.

PBX systems are expensive. If a PBX system gives out on you, then you could be on the hook for some hefty replacement costs. Even if your PBX system never suffers a catastrophic failure, you will likely have to deal with a steady stream of firmware upgrades, hardware upgrades (to accommodate additional users), and repairs. It's probably going to be less expensive (and a lot less of a hassle) to let a cloud provider deal with all of that.

Although there are undoubtedly advantages to using a cloud-based unified communications infrastructure, doing so does come with one big challenge – figuring out which provider to use. As I said at the beginning of this book, my purpose in writing this is not to sell you on a particular vendor's product or service. As such, I am not going to tell you to run out and sign up for some vendor's unified communications cloud-based service.

Choosing a unified communications provider is a big decision. After all, communications are the lifeblood of any business. Therefore, it is only prudent to weigh your options carefully.

But how do you narrow down the list of providers? There are over 120 different providers of VoIP services in the U.S. alone, which offer varying degrees of support for unified communications, so you will need some way of figuring out which provider is the best fit for your organization.

If you are shopping for a unified communications provider, there are three main things that you will need to consider (beyond cost, which should always be a consideration).

The first of these considerations is the capabilities that can be provided by the cloud platform. In short, it would be counterproductive to subscribe to a cloud based unified communications platform that does not fully meet your needs. That being the case, you should start by taking a really objective look at the types of capabilities that your organization needs.

As you evaluate your requirements, try to be at least somewhat granular. It's one thing to say that that the organization needs VoIP capabilities. It is quite another thing to determine that the system should be able to differentiate between an average customer and a really important customer, and that if that really important customer calls after business hours than that call should be forwarded to someone's cell phone, whereas other calls can go to voicemail. This is just one example of the granularity with which you should evaluate your organization's needs.

The second consideration that you should take into account is the provider itself. As you evaluate the various offerings, you're sure to find that there are enterprise-class providers offering four nines of availability (99.99% up time) and financially backed SLA's, while other providers might best be described as fly-by-night. Beyond the provider's reputation however, you need to consider what type of service the provider is really offering.

Cloud-based unified communication providers fall into two basic classes. There are network-based providers and there are over the top providers. Either type of provider can offer you the services you need. However, it is important to understand the difference between these two types of providers.

As you would probably expect from the name, a network provider owns the underlying network that is used for the unified communications services that they provide. Such a

provider owns and operates all of their own PBX switches and networking hardware.

Conversely, an over-the-top or OTT provider uses someone else's network, typically their Internet provider's network, to deliver its unified communications services. The network provider in this case might best be thought of as a middleman in that they provide the unified communications application, but the underlying hardware is from another cloud provider. Some of the bigger name VoIP companies that we are all familiar with are over-the-top providers.

So why does it matter if a provider owns their own network, or if they are overlaying their service on to someone else's network? After all, one of the driving factors behind operating a unified communications platform in the cloud is to be able to avoid all of the nitty-gritty technical details.

Network ownership matters for two reasons: reliability and support. If a provider is simply overlaying a service on top of someone else's network, then, as a subscriber, you probably won't be able to tell much about the underlying network. It's anyone's guess as to whether that network is reliable or if it is secure. You basically have to cross your fingers and hope that the service provider chose a reputable network provider.

If you are thinking about using an OTT service (which may, but often does not, have additional datacenters), then it's also important to consider the potential for technical support issues that may occur with an over-the-top network. Of course, any provider can experience an outage. That's just life. But if a network provider experiences an outage or some other support issue, they presumably have the tools in place to diagnose and correct the issue. If on the other hand, an over-the-top unified communications provider has an issue, they may end up having to contact whomever runs their underlying network. This additional step in the diagnosis and resolution process could theoretically lead to a longer outage. In contrast,

a network-based provider will typically have invested in geo-redundancy, meaning that the service can fail over to another datacenter in the event of a problem, thereby avoiding an outage.

A third thing you should consider is how the service is delivered. This is one of those things that is easily overlooked, but it's important.

Deploying a unified communications platform is something of an art form. One of the big amateur mistakes is expecting too much from the Ethernet segments on a network. Often times, voice traffic is simply routed to an organization's existing Ethernet network without a lot of regard for what that voice traffic will do in terms of network congestion. The assumption is that we all have gigabit connectivity all the way to the desktop, so there is plenty of bandwidth to go around. In reality though, Ethernet networks have a finite throughput. Adding large amounts of voice traffic may cause the network to become sluggish. Worse yet, if someone tries to play a large video file, it may lead to degraded or even disrupted voice calls.

Back in the old days before our data systems and phone switches were all tied together, users typically had two jacks under their desk. One of these jacks was for the phone, and the other was for the computer. The idea of physically separating voice and data communications is still a good idea, even today. If you deliver voice communications over a dedicated network segment, you will never have to worry about voice traffic and data traffic choking each other out.

The Big Takeaway

Unified communications platforms can streamline business communications, making the company far more agile and responsive.

The best way to overcome the financial and technical barriers that once stood in the way of adopting unified communications is to use a cloud-based system. Operating a unified communications system in the cloud frees your organization from the enormous startup costs, while also taking all of the guess work out of the deployment process.

Because the cloud provider handles all of the ongoing maintenance and support, you don't have to worry about trying to become a telephony expert.

Also, network-based providers may include dedicated bandwidth for voice – alleviating problems with call quality and reliability.

NOTES

Take productivity
to new places.
Anywhere and
everywhere.

Explore how **Unified Communications** from Spectrum Enterprise can enhance on-the-go collaboration. Download our white paper, *Your future is calling. Choosing the right Unified Communications partner.*

[Click to the read the white paper](#)

To learn more about Unified Communications, call to start the conversation with an Account Executive.

866-216-4843

enterprise.spectrum.com/UC



Spectrum ▶
ENTERPRISE

Deploying and managing unified communications systems has traditionally meant learning how to program a PBX system, how to support the SIP protocol, and any number of other specialized skills. It doesn't have to be that way though. These days you can host your unified communications platform in the cloud and let someone else worry about the telephony protocols.

This book explains some of the basic concepts and technologies used by unified communications systems. It also discusses how the cloud has changed unified communications for the better, and what to look for in a provider.



About Brien M. Posey

Brien Posey is a 17-time Microsoft MVP and an internationally published author and conference speaker with over two decades of IT experience. In addition to his technology work, Posey is also a Commercial Scientist Astronaut Candidate.

(<http://www.brienposey.com/space>).

Follow him on Twitter @BrienPosey



ConversationalGeek®

Visit conversationalgeek.com for more books on topics geeks love.