

# Ambient Connectivity: An Introduction

---

“Ambient Connectivity” is the ability to assume connectivity anywhere and anytime.

I explain this more in a [talk](#) I gave at Stanford University. You can also see these [slides](#) from the talk.



Ambient Connectivity is the future of the Internet once we’ve removed the barriers we associate with today’s telecom and extend the reach beyond the narrow confines of “broadband”.

## An Overview

The nuanced definition of *Ambient Connectivity* is that we can view connectivity as infrastructure but we need to take responsibility if we find ourselves disconnected. This is in contrast with today’s telecom industry in which we’ve shifted responsibility to providers and can only assume connectivity where a third party has subscribed to a service and there is an unbroken chain of providers all the way to your destination.

To put this in familiar terms, if I have a communicating device in my pocket today, AKA a smartphone, I can only browse the web if my cellular provider has local service or if there is a Wi-Fi provider and I have an arrangement with that provider. And even then, I can only use the Wi-Fi path for data and voice (my telephone service) bits are treated differently from other bits.

This familiar scenario presumes that the Internet is the web and that telephony is something else. This is an impoverished view of the Internet’s connectivity. A major insight from information sciences (AKA, computing) is that we can convert information we transmit to bits and that all bits are the same. There is no difference between voice bits and other bits.

Perhaps more important is that our devices communicate among themselves. A thermostat communicates directly with a furnace – we don’t read the meter and then walk to the basement and adjust a dial. The Web is just one application. Even when we have a human using a device such as a game player, the game program needs to be able to communicate with other players without popping up a screen every few seconds to gain permission to use each new access point.

We’ve gotten so much value out of what we can do using existing subscription paths, as with our computers at home and our smartphones, we fail to see how much more is possible.

There are pacemakers which can report information to nearby monitors. Why shouldn’t that pacemaker be able to report events to a physician when the wearer is simply walking around? All it takes is the ability to relay the bits until they reach the physician.

This is the essence of the Internet’s architecture – you can simply drop a packet of bits onto the network and it will find its way to the destination. Or maybe not – rather than rely on a network provider you take responsibility. If the bits must get there and you don’t get an acknowledgment you can try again. This is called “best efforts” networking. It’s a very simple idea that has dramatically changed our concept of communicating – rather than being dependent upon telecom providers we can take advantage of any available opportunity to communicate.

We don’t depend on any particular path and can simply focus on the problem we are trying to solve, or the application we are building. This doesn’t mean that every application works everywhere – we may not have the capacity to carry a lot of bits so we’d use messaging instead of voice or video.

Thus, if all we have available is a repurposed video distribution system, AKA, broadband, we shouldn’t be surprised to find that it is good for distributing video, as in the example of YouTube. Similarly, with Smartphones we can communicate as long as we have the right subscription plan and the cellular provider has service where we happen to be and we comply with terms of services.

Alas, those terms take the big idea that bits are bits and reduce them to the small idea that we can only communicate when it is profitable to the provider.

Simply repurposing existing telecom paths isn’t enough if we are to get the benefits of all that we’ve learned about digital communications. We need to be able to assume connectivity outside the confines of the subscription paths and we need to be able to add paths ourselves without needing to justify them to a provider.

More important the Internet has demonstrated that we can do so. We don’t need a network as such because the packets themselves can find their way across the network. They don’t really drive themselves like people do; it’s more like a letter finding its way across postal system with each local post office knowing the details of its local routes and the regional post office knowing the spanning paths. We deliver to zip codes instead of people; an approach that greatly simplifies routing.

Once we can assume connectivity, AKA, ambience, we can then take advantage of a common infrastructure for healthcare, public safety, education and simply as a way to participate in the world. For people it means we can use the web, twitter, and play games or whatever else we choose to do.

## Blinded by History

History is an interpretation of the path. We can view Caesar's crossing the Rubicon as merely another river crossed or as a turning point for the Roman Empire.

In the talk I explore three different histories of the Internet.

The first story is the classic story of how the Internet was created as a network of networks. The end-to-end argument (not to be confused with womb-to-tomb) shows that we could indeed use an unreliable medium to create reliable solutions where reliability is defined by the application. In this story we move ahead by incrementally improving existing protocols.

In the second story we look at the paths and how we moved from interconnecting local area networks, LANs, to modems which allowed anyone to dial into the Internet to broadband which gave us the ability to participate once we had a path established (AKA, a subscription). In this scenario we move ahead with more broadband and other subscription paths as with Smartphones.

It's the third story that captures what I see as the essential idea – the ability to simply assume connectivity. The Internet has been an amazingly successful experiment in economics – what if we removed the cost and other impediments and were able to focus on the relationships between two end points. In the classic Internet those end points were mainframe computers. Today the end points can be something abstract like the ends of a conversation as with Skype.

In this third story we move ahead by building upon this idea and giving ourselves the ability to assume that we can connect. And if we can't we add more paths independent of any particular applications – it's just more infrastructure.

Ambient Connectivity builds on the essential idea of the Internet and takes us to the next stage.