ATT's Plight is our Plight

Abstract

ATT's planned acquisition of T-Mobile is an occasion to look at the fundamental issues facing the entire telecommunications industry. The business model that worked for telegrams does not work for bits.

Very simply – we are asking providers to add capacity but we're not willing to let them share in the value created (as with a VoIP call). Worse, the more capacity there is the less valuable the carriers' own services are.

Telecommunications is a funding model based on the assumption that a network service provider is adding the value as in days when the network carried voice and not just bits.

We need to shift to a funding model that doesn't work at cross purposes with the Internet's generativity. This generativity comes from decoupling our ability to exchange bits from what we create using those bits. It requires that we fund the whole, *i.e.* infrastructure, rather than having to make each part profitable in its own right as we do now.

Imagine if we tried to fund public pavements as a profit center by making people pay for each walk they took.

With telecommunications, we take the abundant and inexpensive wires and radios and then pay large amounts of money to confine bits to billable paths.

Just as we pay for the wires and radios in homes, offices and campuses we can fund the wires and radios in our neighborhoods and cities.

We can do this by acting locally within our communities by creating a local commons and aggregating our purchase of transit outside the neighborhood. Eventually these local efforts will interconnect to form a new global commons.

We need to recognize that the limits on capacity are driven by markets and not fundamental limits of technology.

Our Plight

As I listened to Ralph de la Vega, CEO of ATT Mobility, at *All Things Digital (D9)* I was struck by the complacency in the room full of investors who listened to him telling them that they could not do anything without first having to make sure that it profited ATT.

At the heart of the problem is a business model that no longer works – ATT and other carriers are losing their ability to make money by owning the network.

In a normal marketplace this problem would've been resolved very simply by having new approaches supplant the ones that were no longer viable. But this is not a normal marketplace. The FCC, which regulates it, was formed in 1934 because we recognized that there were problems in the marketplace.... but at that time (the Great Depression) we didn't expect markets to work.

It is hard to write about this issue without seeming to be hyperbolic. Yet the absence of the rapid improvements we'd expect according to Moore's law should set off alarm bells. Our ability to take information and represent it using ones and zeros should have created an ocean of opportunity but instead we find ourselves dependent upon providers' narrow pipes.

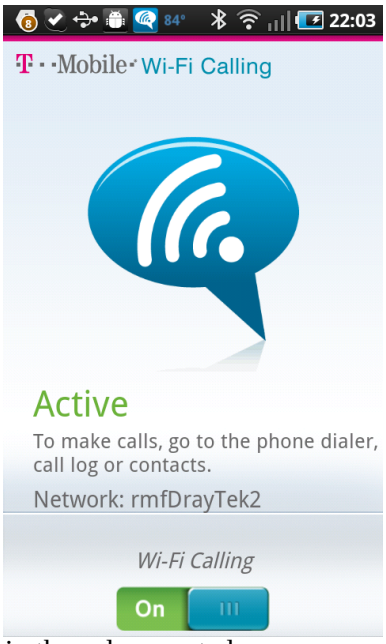
We sacrifice the generativity of what I've called "Ambient Connectivity" (the ability to assume you are connected without needing to subscribe) in favor of these "pipes". With the Internet we can communicate by exchanging bits using any means available

Today's telecommunications industry is centered on creating billable events – a model that goes back to the days of telegraphy. Instead of owning our wires and radios we are tenants paying each time we exchange bits. We confine these bits to narrow paths so that they can be counted and to generate billable events. These billable events act, in effect, as a tax on innovation by denying us the ability to pay once and take advantage of the zero marginal cost.

We accept the idea of, in effect, billing for bits because it seems to be a consumable like electricity. But bits are like letters of the alphabet which we exchange but do not consume.

I purposely use the term "infrastructure" rather than "utility" to emphasize the idea that we create the services ourselves by exchanging bits over physical media (wired or wireless).

Yet it's hard to escape more than a century of telephony as a service. In fact, it wasn't until the 1980's (in the US) that we achieved ownership of the phone wires in our homes. Until the 1970's we weren't even allowed to plug in our own devices such as answering machines.



And now, thanks to Internet technologies, the carriers can't count on future revenue from voice. Voice is just another data type that can be represented in bits. The value is created in the VoIP application using commodity bits. The operator doesn't get to benefit from this added value. Once you realize that, you should ask why a provider would want to own the wires in our apartment buildings or our neighborhoods when they do not share in the value created.

Today we're excited about "mobile" and the opportunities it offers but we still presume we need to have service providers and we accept the idea that we can only attach approved devices to their pipes (even if those pipes only exist in our imagination).

These services (or "pipes") are created using wires and radios. We don't need to depend on service providers. In fact we do create networks ourselves using wires and radios in our homes.

Cellular is no different than wired services in that we are moving from services like voice to treating all information as data (or "bits"). UMA (Unlicensed Mobile Access) is one of the protocols that allow cellular traffic to go over the Internet and take advantage of Wi-Fi. In fact a conversation can move from Wi-Fi access point to access point as well as to and from cellular. The carriers are losing control of the pipe because relationships are no longer tied to a particular path.

We've created scarcity by treating spectrum as if it were a physical thing. The Internet has freed us from the confines of these narrow bands and we now understand that there is no distinction between wired and wireless bits. The idea of spectrum bands as pipes is as obsolete as the long-past era of crystal radios.

So how are the carriers going to generate profits (or even cover their costs) in the future? Without the ability to make money using their bits and without the ability to restrict bits to billable paths, they certainly can't continue with business as usual.

We (as communities) need to start to transition from being subscribers to being owners. We can start locally by joining with our neighbors to own the wires in our buildings and neighborhoods. We can then purchase inexpensive transport beyond our neighborhoods from providers as we extend area covered by infrastructure. We can buy our own gear in a competitive market and pay people directly for operating the networking facilities on our behalf.

Eventually we'll directly interconnect our infrastructures just as we connect roads and will no longer have to pay merely to exchange bits between two end points. Traditionally we've paid carriers because they promised reliable and timely delivery of packets of bits.

The classic End-to-End paper lays out a guiding principle for the Internet – you create solutions without depending on those along the path. The choice of the term "end-to-end" is unfortunate in that it is often confused with the more common notion of a provider doing everything as in "womb-to-tomb". It means just the opposite – only the end points need be involved in the relationship. You connect to a website without worrying about the wires in the middle.

The idea that a phone conversation doesn't even exist as such in the network but only outside the network is counter-intuitive. No wonder it is so hard to let go of our presumption that we need a provider to assure we can communicate. We need to be careful to distinguish between communicating in terms of humans (and others) exchanging meaning from communicating in the sense of merely exchanging bits.

We also need to remember that the Internet is not just about the web or telephony – it's also a chance to create services that a provider cannot even conceive of.

But why bother when things seem to be working well now? Because the health of telecom is only an illusion. The carriers are facing an existential threat. De la Vega did as best as he could to put a smiling face on a dire situation.

To understand his plight we need to ask, what is the business model of a carrier once it's just providing raw data transport (that is, helping us exchange bits)? It gets none of the value created using those bits for web services and sales, voice traffic (Skype, VoIP) or any other applications. In fact T-Mobile recently announced it was dropping any usage charges for cellular over IP[i] so it doesn't even get revenues for cellular once the bits go over IP and soon they all traffic will go over IP.

De la Vega feigned uncertainty when it came to UMA. Is it possible that ATT wants to try to force the bits back in the pipe? ATT will likely abandon T-Mobile's transparent policy of not charging users a premium if they bring their own

phones. ATT forces users to pay what is, in effect, a financing fee even when ATT hasn't loaned them money to finance the phone. (Shouldn't the FTC look into this?).

So why should we, entrepreneurs and users, expect ATT to keep increasing capacity when we aren't willing to pay them for that capacity? We keep the value we create to ourselves. That's why Skype doesn't have to charge for calls as long as you don't transit to the traditional phone system.

For now carriers have two primary ways to make money – pipes and services. They can offer their own services such as voice, apps, ringtones and whatever else. But increasingly, third parties are able to compete very well with the carriers – it's a matter of numbers. More problematic is that competitors aren't burdened by having to fund the network.

Moreover the competitors can innovate far outside the confines of traditional telephony as we see with Skype. The carriers use complex protocols to hand off calls from one cellular tower to another and a single glitch will drop a call. Skype doesn't depend on the network for maintaining the relationships so can scale far more easily without owing the carriers for such services. No wonder ATT feels put upon

Currently carriers charge for the use of their pipes, but as we see with Wi-Fi, it's increasingly difficult to confine the traffic to their billable paths, especially in "wireless" where Wi-Fi offloading puts them in a bind. That offloading is deemed necessary to address the scarcity of spectrum (even if artificial) yet it also creates abundance that moots the scarcity arguments. In fact there is a lot of wired capacity outside the pipes, so much so that Reed Hastings commented that he could carry all the Netflix traffic on a single strand. With that much capacity it is hard to maintain any price above zero.

Not only is it problematic to ask ATT to provide more capacity, we are using that capacity to compete with them. No wonder they try to limit data traffic and prevent tethering – they are trying to claw back the value.

ATT has been down this road before when they bought MediaOne to create ATT Cable. They paid a huge premium because they bet they could indeed get a portion of the value of the commerce conducted over "their" cables. They were wrong and Comcast bought them out. They lost six billion dollars on a similar bet with Excite@Home. That version of ATT failed and SBC bought the name but rolling up Baby Bells doesn't address the underlying problem – it only delays it. Shareholders beware.

Banning Webcams was the early attempt to control what we do with bits in the privacy of our homes. Today we see the same intrusion in banning tethering. Remember that the 1990's plan was to model their Internet service on the set top box and charge per PC. The essence of making home networking DIY was to block that by making our home opaque to the carriers thanks to the NAT (AKA firewall/router). The provider can't charge you for each PC because the subscriber can't peek past the router.

ATT is excited about Smartphones because they seem to bring back the glory days of charging for each device and charging for services. But it will be a short-lived respite because as the phones get smarter they will be less dependent upon ATT. In fact the carriers themselves are pushing devices for sharing connections as with the MiFi unit. For that matter, many phones have tethering. But do I use UMA over Wi-Fi or do I use the cellular connection and run my phone as an access point (tethering)? My friends and I can share a single device to provide a "hotspot" (Wi-Fi sharing, tethering) and then use UMA for cellular. And if we don't have UMA we can use a VoIP application.

Sounds confusing?

Indeed it is – a lot of twisting and winding passages whose complexity seems to exist for complexity's sake. At what point do users simply cut through this Gordian knot and demand and get simplicity? And what happens to ATT when all the myriad of paths collapse into a single "data commons" where they get neither the revenue from the value created nor the control of the pipe they need for billing?

Perhaps ATT believes it will get more for selling bytes despite the industry's own awareness of the dangers of abundance. They have a desperate need to believe they can add value to the Internet by adding a control plane such as IMS (IP Multimedia Subsystems). That might be true if innovators such as YouTube and Netflix had to play by carrier rules.

Many investors believe in the pipe model and think the solution is more pipes. Spectrum is seen as just another pipe – one that only makes sense if you really needed an entirely separate infrastructure for wireless bits. Wi-Fi undermines this argument by freely moving bits between wired and wireless segments. You don't need to think much about spectrum if you only need to reach a nearby wire, nor do you need to expend much energy.

It's not just that we are escaping the pipes. Without the constraints of billing, we can choose wireless paths that use the least energy and take advantage of any available fiber.

Charging for traffic is complex and expensive. The reason we had unmeasured local phone service in the US was that it was too difficult to maintain a billing record for each call. European users were more trusting in accepting simple counts of ticks rather than billing records and thus they didn't go to unmeasured local service.

Think of how difficult it is to enforce a cap on cellular traffic for mobile devices – you have to gather the byte counts for millions of packets for each phone from any cellular path it happens to use. That can double the traffic – kind of makes the scarcity story seem strange because it is strange.

In earlier writings I've lumped telephone companies and cable companies together. I now see the business models diverging because cable companies make money on the content rather than by owning the network. Thus Time-Warner spun off their cable division and Comcast shifted assets to NBCU.

If we look at Kansas City where Google is planning to provide gigabit fiber, why would Comcast want to maintain its own cable system when it could save all that money by delivering their content on Google's dollar?

At "D9" I put that question to someone in the business of enabling TV to go over-the-top (OTT or over IP). HBOGO is an example. If you have HBO on your cable subscription you can watch it anywhere you have an Internet connection.

I wouldn't need a Comcast cable to watch their content. So I asked why Comcast would still want the cost of its own infrastructure. The OTT guy was puzzled because the cable represents such a small part of the cost of today's cable subscription.

Yet the cable providers charge a lot of money for the Internet connection because they tell us it's very expensive. We're being told stories that don't make sense – we shouldn't accept a lack of transparency for something so fundamental as our ability to communicate.

The actual cost of using "broadband" for carrying bits is very low – that money we pay in subscriptions could be better invested in creating new value.

The providers use their cable to lock users into their services. Why isn't the business more like VoIP where companies like Vonage offer their services to subscribers everywhere?

We don't have to speculate. Both ATT and Verizon had their own VoIP offerings but dropped them because they benefit from high costs which justify higher prices. Even when there is no dedicated wire, as with FiOS, they still charge high prices as if there were still a wire! Everything has changed but the carriers continue business as usual.

The belief that we need a different physical cable for each provider is the crux of the problem. Having a separate pipe for each purpose gives the carriers control and the ability to bill and not just bill but charge premium prices. If the cost is so incidental, then why are they able to get paid a monthly fee for wires that we've already paid for? In effect we've financed our vital facilities with a loan we can never pay off.

This is "broadband". It's a pipe that a carrier uses to deliver the carrier's own services. We need to stimulate broadband because we are fighting against market forces instead of working with them. Instead we need to take an approach that addresses the structural problem by creating a sustainable business model in which the players benefit by rapid improvements in price/performance.

We're not talking about a moral problem here but a simple business problem. It's not enough to desire neutrality or openness. We need a market that functions well without the need for strong regulation.

We think we understand the broadband story and treat it as settled. Perhaps this is why we are focusing so much attention on "wireless" where there is currently so much complexity and thus room for obfuscation. But the scarcity is no more real than it was when modems threatened to bring down the phone system. By simply moving data traffic to a native transport the problem vanished and the same will happen once we stop segregating wireless bits.

More to the point, wireless mobility is exciting and a great enabler because it means we can be connected anytime anywhere ... as long as the carriers can make money. This is really the crux of the problem ... availability. If ATT (or another carrier) isn't making money then we're in a dead zone.

It's like expecting the railroad to serve every farmhouse whether or not they can make money. We tried this in the past by creating an arbitrary and expensive system to subsidize rural phone service (the Universal Service Fund). But that became a multibillion dollar boondoggle that limited availability by keeping communities in the age of telephony rather than the age of the Internet. The European approach is to require placement of cell towers everywhere.

Telling carriers to add towers won't get you access in places where the radio doesn't shine. The ability to do voice over IP (as with UMA) means that we can extend cellular coverage ourselves by adding access points.

But how do we get strangers to share their capacity?

We are attempting to encourage the spread of Wi-Fi either as a reciprocal courtesy (as with FON) or by extending the billing model. Adding account management to all access points is a bizarre idea that only seems reasonable once you realize that the creation of billable events is at the very core of the carriers' world.

It's a very real problem, for example, how do you create a connected pacemaker if you need an accounting module at the heart of a device? Imagine your pacemaker is calling for help, only to get told that your provider doesn't have service in that area.

The whole thing is crazy and not at all necessary! Things become very simple and sustainable if we think of connectivity the same way we think of sidewalks and porch lights. There's really no need to work so hard to maintain the current Byzantine system of billable events.

Let's cut to the chase and get to bare wire or fiber or low power local radios. You can buy the gear you need at any store, just like people do every day for their homes and offices. Access points and wires are available at a very low price thanks to a very competitive market and there is no monthly fee. If you need help you just ask your neighbors or pay for support as with Geek Squad.

And that model works just as well for sharing with your neighbors in your building or on your block or in your city. Pay once and buy good stuff cheap. With reasonable protocols you can have backup paths always available and report failures before they become critical. Since you (and your community) are paying, you are in control.

Contrast this with today's telecommunications system where a single failure brings down your connection. And you will probably have to call your carrier yourself to report the problem – they typically don't do the most elementary network monitoring. Unlike most merchants they limit how much you can buy.

Why do we have to have a subscription and authenticate ourselves merely to communicate? You don't have to subscribe to sidewalks. Indeed why can't we treat the wires like sidewalks instead of expensive pipes?

We saw an extreme form of the problem at a recent Apple developer conference in which many attendees had their own Verizon access Wi-Fi so that they could each use their own 3G accounts for their iPads. Instead of contributing to the commons, they were fighting each other for access![ii]

It's that simple.

The business model of telecommunications requires making you dependent upon a provider. You are not an owner in control. That should be grating on entrepreneurs.

The perverse complexity of the cellular phone bill creates a protective barrier that leaves us focusing on such concepts as "termination fees" or wondering why most carriers charge us a fee even when we bring our own phones. Why do charges for such services as SMS go up when the costs to the carriers decrease?

In reality the cellular charges are constructs based on a business and accounting model. What is more important is that our willingness to pay for any product is based on our accepting the story we're told. In a restaurant we think we're paying for food when we may really be paying for the space we occupy while we eat.

With restaurants we understand that we can just buy the food from a grocery. The carriers need complexity to hide to stark truth that we can do it better ourselves. We don't need to pay a premium for SMS and other cellular bits.

Perhaps the biggest challenge is accepting the idea that telecommunications is a problem of our own creation. If we just switch the funding model to pay once and hire people to maintain the facilities, the scarcity will vanish as fast as the speed of computing increased when we went from computing as a service to owning our own computers.

This approach may work well for the wires in our local communities but how does this gives us the national and global systems we have today? In the 1930's the only option seemed to be a national system operated as a unified network. Today we have an alternative that is apparent once we demystify networking.

We need to be careful in talking about the Internet to distinguish between what we do with it (such as the web) and the basic systems for exchanging bits.

By exchanging bits among the local systems, a global network emerges. Regional efforts can provide spanning connections much as today's highways complement the system of local roads.

It is a testament to the power of the Internet as an idea that we can reinvent the Internet from the edge without being limited by the artifacts such as today's IP addresses.

We need to remember that there are many stakeholders in today's world of telecom. Cisco would rather sell a $50,000 router to a carrier than a $50 router to a community. So let's be careful about the advice of such experts and think for ourselves.

The telecommunications industry is trying to get ahead of the process by branching out into other businesses. But few companies survive such drastic changes and the economy can't afford to wait. Even if we can't change everything at once, we do need to start moving towards owning our own ability to communicate.

Unlike the 1930's when we anointed "Ma Bell" (ATT) to be "The Phone Company", we can start locally and build from individual efforts.

Infrastructure is an enabling technology. So why are we spiting ourselves by trying to operate it as a profit center?

The carriers have done a remarkable job of hiding their plight from policymakers. But sophisticated investors and entrepreneurs like those at "D9" have no excuse for suspending their disbelief.

While the business model of cellular telephony is problematic, bits are bits. Building separate systems for each business model makes no sense. This includes building a special system for emergency works. Did we build a separate interstate highway system for the military? Of course not, we did just the opposite – we used the defense needs as a rationale for a common highway system.

In the 1934 we didn't understand "bits" so we assumed that we had to have a phone company in order to make phone calls. We now understand that is not at all true and can no longer feign ignorance. ATT's plight is indeed our plight

We must embrace the abundant new reality and stop living in the past.

Epilog and Further Reading

To fully understand the carriers' plight and society's needs we need to understand the interaction of markets and technology and accept fundamental ambiguities The Internet has been generative because the various interpretations of information and its application can coexist and share a common set of facilities.

This essay has focused on the business model of the telecommunications industry and the fact that the value is entirely external to the network. Thus we need a funding based from the community as a whole, namely infrastructure.

Not everyone accepts this idea because it seems as if one can indeed do better by treating some bits better than others. The subtlety is that some bits may indeed be more important but the network can't know that. This is fundamental because there isn't a single universal measure of importance.

Others believe that the costs of telecommunications require large capital investments.

Understanding the Internet requires thinking very differently about connectivity. I explore these ideas in other essays including:

- The Internet Lost in Translation. Our understanding of bits is relatively recent and the implications are not at all obvious with Claude Shannon's rules treated as physical limits rather than mathematical constructs.
- No longer a superhighway. The problem of forcing us into a myriad of pipes.
- Why the Broadband Internet misses the point of the Internet.
- Assuring Scarcity. Based on a presentation posted on a European regulatory site explaining why abundance is a threat and how to prevent it!
- Spectrum as Farmland. Why spectrum scarcity is due to solely to policy and violates the US First Amendment. Shannon's laws do not place a limit on the physics of exchanging bits.
- Promises vs. Discovery. In order to fully understand the shift from telecommunications to the Internet we need to accept that not everything we want will work. We have to discover what does work and use our imagination to work within the constraints. Fortunately the Internet is not static and as it grows the possibilities increase rapidly.

[i] I've found that calls over IP are only free for some accounts. But you have to ask for it – it's a no-charge feature but, as is typical, you need to explicit ask for the "feature". Also not all protocols support messaging over IP!

[ii] Of course that doesn't excuse "Wi-Fi" from failing to scale to handle the density.