

Forces Shaping Next Generation Networks

Net Forecasts – Peter J. Sevcik

BCR Volume 35, Number 1

January 2005

The recent Next Generation Networks conference brought together industry leaders and luminaries for the 18th year and counting. The conference had all of the usual predictions of what is coming, while explaining why the things that were supposed to come failed to appear. This year, I was fortunate to participate in the conference synthesis, which is the traditional last session. Although we all did our best that afternoon, I've had more time to process what I heard at NGN, and would offer this more complete synthesis.

First, a few general observations. There have been and will continue to be many networks in the world, and even in most enterprises. Keeping the title of this conference plural is a must. Second, as industries mature, the nature of what constitutes the “next” new thing also changes.

The revolution we've witnessed over the 36 years since the Carterphone decision centers on a new class of network user: the computer. Out of necessity, computers spawned their own network technology. In the 1980s, the number of alternative computer network technologies peaked with a babble of incompatible and incomplete proprietary solutions struggling in a fractured market. The TCP/IP standard put an end to squabbling over the network layers and opened the door for innovation in applications. Success brought huge growth during the 1990s. By the start of this decade, the family of protocols designed for computers was also taking on voice and video.

The keys to the success of this story are two. First, the technology was flexible to use because it provides very little service inside the network. The dumb-net and smart-edge philosophy worked. Second, the “users” could evolve quickly since they were computers that kept getting faster and could be quickly reprogrammed. What makes the phone network difficult to change is it tries too hard to provide complex services, and the users—people--do not evolve fast enough to do much that's different with the service.

For example, our PCs and PDAs have improved in their ability to use networks several-fold, to the point that these endpoints are now a part of their

networks, rather than just users on those networks. In contrast, look at how little we've advanced in our ability to do hands-free interface with the phone network. If we could only learn to whistle the touch-tones, there'd be no need for buttons or hands to use the phone. But instead, what we have is voice recognition systems that reside inside the network and work so poorly that hardly anyone uses them.

So that's the backdrop. Based on what I heard at the conference, I propose that four major forces will shape next generation networks:

Innovation Moves Up And Out

The bulk of technical innovation is shifting from network cores and low-layer protocols to the edge and upper-layer protocols. This movement up-and-out is both a natural progression of the TCP/IP success story and a byproduct of core network scale. The core is huge, must operate non-stop, and is built out of optical components and ASICs. The core can't change quickly any more.

But the edge is still fast-changing software running on general-purpose computers. These innovations are strictly focused on Layer 4 and above, where the news is what it does--the application--rather than how it's done.

This innovation is evident in homes as well as enterprises. There is a revolution in home appliances, computers, entertainment systems and home wireless LANs. Enterprises are also taking advantage of new smart edge solutions for application delivery (see BCR, July 2004, pp. 10-12).

The difference between these two fast growing markets is that the home is just starting to experiment with many new boxes, while the enterprise market will soon consolidate its many boxes into integrated multi-function application delivery platforms. The “home gateway” that some people foresee as the master control center for information and entertainment is still a long way off--and may never be justified. New home functions and uses are still emerging, which makes integration impractical.

Technology Lock-Down

The picture presented above is exciting and promising. However, there is an equally powerful—and sinister—force working against it. Carriers have seen the writing on the wall: They are in a commodity business where they must sell more for less, which translates into falling revenues. They do not know how to develop sustainable business models due to their heritage of government protection.

But big carriers have power, and they are finding new ways to use it. They are using their purchasing clout and customer base to go back to forcing the consumer to buy the terminal with the service. This tactic is most widely deployed by the wireless telephone carriers. They give you a phone from a very limited pre-selected set of cell phones that they offer. These phones often have features blocked, in order to prevent the user from accessing alternate forms of service. The carrier is the only supplier of the new ring tone, wallpaper, picture transfer or news, even though alternative services exist.

This strategy is a direct opposite of the previous up-and-out innovation engine. What's more, it appears that wireless carriers are having success employing such counter-innovation strategy. In the UK, the provider Orange has gone so far as to force its cell phone suppliers to remove the cell phone company's name or brand from the phone. They want the consumer to not even think that any part of the service is supplied by any other company.

This draconian strategy is not limited to the wireless industry. Cable operators have long forced consumers to purchase the set-top box or cable modem from the provider. It is all in the name of consistent service and adhering to standards. That is exactly what the Bell System told us back in the 1960s. It is a good strategy for a utility, but not a strategy where the next generation is born.

This trend can have very broad implications. Imagine the copper or cable carrier blocking Skype in order to force you to use their VOIP service.

Power Concentration

Even as carriers are working to lock down the technology, big players of all sorts are moving to consolidate their market power in the networks of the future.

For starters, not only are carriers exercising dictatorial control over their own networks, they're also seeking to extend their domination over the playing field on which those networks compete. Not content simply to wield monopoly control over the last-mile copper (and soon fiber), the incumbents are fighting any newcomers.

For example, alternatives like wireless or municipal broadband are being stymied. Notice the recently-signed law in Pennsylvania that prohibits any municipality from building a local Wi-Fi access network without the incumbent carrier's permission. This was a direct reaction to Philadelphia's plan to turn the city in to a giant hot-spot. Verizon won, and more states are taking up similar legislation.

There will continue to be outright or near monopolies all over the edge, starting with Microsoft Windows, but the stage is set for new concentrations of power in the form of ubiquitous platforms controlled by a single company. For example, Qualcomm's CDMA clout is being leveraged to build their MediaFLO wireless network, which will deliver 50 to 100 channels of national and local content, including as many as 15 live streaming channels in addition to channels featuring video clips and audio. This content will go out to millions of cell phones.

Pure business clout is another form of power. The Internet was long seen as a place where every flower gets a chance to bloom on a level playing field. Those days are fast disappearing.

Electronic commerce is already concentrating. Despite the very cool offbeat things available on-line, most people don't go off the beaten path. They are more drawn to the big-name location on-line; in the bricks-and-mortar world, the top three stores have about 10 percent of the retail market, but the top three on-line retailers have more than 20 percent of the on-line retail market.

It took four decades for the automobile industry to consolidate into the Big Three, and the big-box stores achieved retail dominance in three decades. The Internet has its Big Three (Amazon, eBay and Yahoo) in less than one decade. The lesson is that basic business processes still apply to the on-line world; they just get to the end-game much sooner.

This concentration of retail power will only get stronger. Big retail translates into big leverage over suppliers and a reduction in consumer choice.

Finally, there is the simple concentration of traffic into a few destinations. People think that they chat with and send emails directly with a vast number of people around the globe. But much of it is funneled and processed by a few message centers like AOL, Earthlink and MSN. Likewise, Google is the search king. Notice that the only contenders trying to unseat the king are other giants already mentioned (MSN and Yahoo).

Speaking of search, despite the vast number of sources for information (anyone can set up a website or blog), most users gravitate to a few places. Search engines help users navigate, but each has a process by which they put some sites at the top of the list of the thousand hits on a query. That process feeds on itself and eventually a few sites become the permanent fixture in the top 10 presented. Very few people look past the first 10 hits.

The effect of this concentration is that 90 percent of the traffic is coming from 10 percent of the locations. The Internet is turning into something that looks more like the world of broadcast. The big on-line locations have as much of an effect on the network as the mall has on the traffic in your town. They demand special treatment, get special concessions, influence network traffic distribution, and will likely be your only choice on that carrier-supplied access device.

Regulation

Of course, the ultimate power player is the government, and it's a sure bet that the Internet will not remain unregulated for much longer. Let's start with the basic foundation of the dumb network philosophy. Most broadband users pay a flat rate for an access line that they can then use for anything and in any way they like. The actual Internet transport infrastructure is a common resource for all these users. This is a prescription for a classic tragedy of the commons.

We are there today with inconsistent service, bottlenecks, spam, virus attacks, spyware, phishing, identity theft, trademark violation, intellectual property theft, and the list goes on. By design, the Internet does not protect users. It is up to the users

to protect themselves. This is the grand bargain we struck for all the innovation, and we need to maintain that bargain if the innovation is to continue.

And even well managed enterprises are not doing so well at protecting their users and information assets. It was interesting to listen to the security sessions at NGN, where the consensus was that there is no technology fix coming, so companies must strive for ever-more-difficult security best practices. This is becoming a hindrance to economic growth. The escalating cost of securing our systems is analogous to the escalating cost of energy.

So it appears the expected edge innovations that should solve these edge-based problems will not materialize. If the industry concedes that there is no hope then the government will see no alternative but to step in and regulate.

Finally there is the small matter of money. Although e-commerce only represents about 2 percent of all retail sales in the U.S., it is growing very fast. The government is always looking for a new source of revenue. Electronic commerce will surely be taxed. It is not a matter of if, but rather of when. This will be another sea change in how the Internet is accessed and used.

All of these regulatory changes will have a profound effect on networks. Network architects will be well served to plan for this eventuality rather than to ignore it until it is too late. Ask the question, "What could the government do to affect this new network, product, or architecture?" For example, it was a serious mistake to standardize VOIP and SIP without any provision for E-911 services. What were technologists thinking? When the government stepped in and forced E-911 adoption, it became a big problem that required costly system changes.

Conclusion

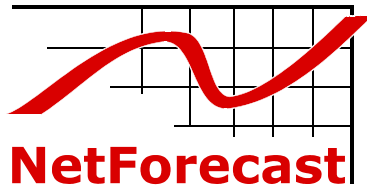
These forces are set to clash: Innovation against walled gardens. Business might against government power. Notice that technology has very little influence in shaping the future. The next generation networks will be defined by how the trends find temporary states of co-existence. Expect instability and a landscape that's vastly changed from the one in which the Internet grew up.

The players who control these forces will build the next generation networks. If current network professionals don't approve of this reality, because they feel that networks are the province of technologists operating at Layer 3 and below, then they will simply be left behind, tending to infrastructure. If you don't want to be left behind, start studying economics and politics.

Peter Sevcik is president of NetForecast and is a leading authority on Internet traffic, performance and technology. Peter has contributed to the design of more than 100 networks, including the Internet, and holds the patent on application response-time prediction. He can be reached at peter@netforecast.com.

NetForecast helps change delivery systems to improve the performance of networked applications. This includes advising enterprises on how to evaluate, improve and manage the performance of business applications, as well as advising vendors about customer requirements, technology issues, and adoption trends.

Smart Strategies From Hard Data



www.netforecast.com