

Shaping Today's Telecom Industry

It begins with a single dot of paint on a blank canvas. Then another. And, another. Weeks later a masterpiece emerges from the profusion of paint dots. The artistic school is Pointillism, it was perfected by Georges Seurat, and it yielded such masterpieces as his *Sunday on the Island of La Grand Jatte* (Figure 2-8).

Our industry is pointillism at its best. So many disparate vectors guide the industry that it is often difficult to step back and actually see the masterpiece as opposed to a collection of unrelated dots of technological paint. As you read the following vignettes, think of them as inconsequential pieces of fabric in a quilt, or spots of paint on a canvas, the combination of which yields something complex and dazzling. Think also about the five forces we discussed in the last section and how they are related to the material that follows. Most important, think about the concept of IMS – a network environment that adapts to user requests for service.

Many factors have combined to create the telecom industry as we know it today. One of the earliest was the arrival of widespread mobile telephony and the “training” of the marketplace to accept lower quality service in exchange for the freedom of mobility. This is an important construct, primarily because it trained the market to accept lower quality service – *period*, and therefore paved the way for the arrival of VoIP. By the time it became prevalent, cellular voice had been around for a couple of decades and the marketplace was somewhat inured to the idea of service that was lower than carrier-grade.

Equally critical was the growth in broadband access availability and the widespread use of and reliance on the Internet and World Wide Web. As more and more users enjoyed the capabilities of broadband, demands for improved QoS caused technologists to focus in on the forces responsible for less-than-desirable service - jitter, latency, and packet loss. Soon networks and users

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benefited from higher bandwidth, improved routing switching and algorithms and more expansive buffers.

As convergence progressed, applications emerged. Avaya, Lucent's former CPE division, announced a product that allowed a user to sit at their PC – *and listen to their voicemail messages!* Today we laugh at the idea, but in those days it was quite remarkable and was one of the first real implementations of functional convergence. The promise of application integration, bundling, and unified messaging, in turn, led to experimentation with packet voice and ultimately to the introduction of VoIP.

As application capabilities emerged, demand for end-to-end broadband throughput grew to unprecedented levels. Broadband access, high-speed routing at the edge of the network, MPLS, and growing support by carrier-grade routers from the likes of Cisco and Juniper moved the perceived bottleneck out of the network core and into the application running on the end user's device.

In 2001, the telecom bubble, which had been growing to untenable heights, collapsed under its own weight, taking the telecom, telephony and IT markets with it as \$7 trillion in market value evaporated. The market, accustomed to the frenzy of capability that was so much a part of the bubble, developed intense heartburn over the collapse. Customers' love affairs with technology come to an abrupt end, and a budding romance with services and business enhancement begins. Customer intimacy, solution selling, Customer Relationship Management (CRM), Enterprise Resource Planning (ERP), data mining and knowledge management become the most common phrases in business lexicon. Technologists jump out of the driver's seat (or, more likely, are pushed); the customer jumps in with four simple questions. You burned me once, they say; you won't do it again. If I buy from you, if I invest in this new technology that you are offering to me, will it raise my revenues? Will it reduce my costs? Will it somehow either enhance or at stabilize my competitive position? And will it be

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mitigate the downside risk I face, operating in an increasingly and aggressively competitive market? Scratching their Information Superhighway road rash, service providers and manufacturers look to reinvent themselves. Along the way, they learn a new word. And the word is, *Solutions*. Too bad nobody seems to know what the problem is.

In response, customer service demands reach an all-time high. Call centers and contact centers grow like crabgrass. Outsourcing and offshoring become the watchwords of the day, and corporations race to move operations to India, the Philippines, and eastern Europe. Enterprise speed and agility, particularly as they relate to customer service, become prime differentiators. The ability to maintain customer contact and continuity is viewed as a critical contributor to customer satisfaction – and revenue assurance.

The customers continue their push. Recovery from the burst bubble leads to industry consolidation, buy-down and intensifying competition. SBC acquires AT&T, proving once and for all that the child is father to the man. Qwest pits itself in a futile, all-out acquisition battle with Verizon, but in the end, Verizon walks away with the MCI prize. Sprint and Nextel agree to merge, friends forever.

Customers, seeing fewer players on the field, react predictably, pitting one vendor against another in a pricing and service delivery frenzy.

Watching the industry die the death of a thousand cuts, regulators wait quietly, pensively in the wings. The Telecommunications Act of 1996 was, by many accounts, a failure; they are loathe to repeat the bloodletting. Regulatory reform favors the incumbent and facilities-based competition, leading to an upsurge in cable, wireless and power companies offering voice over their newly deployed IP infrastructures. They do it because they can and because voice was, is and always will be the killer application. Suddenly IP represents the fundamental underpinning of the “triple play” (voice, video and data) and a growing

realization that the ILEC is no longer the only game in town for carrier-grade service.

The incumbents, however, are not content to lie quietly while their market is picked off by a pack of fast moving would-be competitors. VoIP and related technologies continue to evolve and improve as networks become broader, faster and more capable. In response to the broadside attack on their market, the telcos counter, announcing service packages that include entertainment and broadcast content delivered over DSL, in effect their own triple (and in some cases, quadruple) play. SaskTel offers a full complement of cable content over its DSL network in Saskatoon and Regina. Telus announces TelusTV. Qwest, Bellsouth, Verizon and SBC all announce broadband access buildouts and deeper fiber penetration, all intent on capturing a place in the lucrative content game.

So where has this taken the industry? One predictable side effect is that the game has become one of offering boutique services in a commodity market. Basic technology has indeed become a commodity, as have Internet access, storage, wireline voice, long distance, content of many types, switching, routing and wireless. And as if commoditization isn't enough, the industry reels from attacks by the modern day equivalent of Visigoths and Vandals, riding down from the north to wreak havoc on the electronic villages. Blows against the beleaguered empire come from Skype and Vonage, Yahoo! and Google, Virgin Wireless, Microsoft, and an increasingly demanding and technologically adept customer base. Skype and Vonage successfully undermine the ILECs' positions of circuit-switched power, demonstrating just how good – *and free* – VoIP (over Internet) can be. While the ILECs lose access lines at the frightening rate of 10,000 per day, Skype *adds* 150,000 every day. Yahoo! and Google make IP-based mail, chat and storage applications available to the masses – at no charge. Google's Gmail offers three gigabytes of storage to every user, telling users not to delete files – Google will add storage on demand. Virgin Wireless proves (1) the power of brand and (2) the increasing irrelevance associated with owning

the network – and the power inherent in owning the customer and working the brand loyalty game instead.

Microsoft, in turn, codifies everything, extending their desktop and set-top-hungry tentacles into every possible customer touch point. They are desktop, set-top, palm-top, mobile, gaming, content, application, operating system, and central office. They don't want the infrastructure; they just want the customer. So they revamp Windows XP, call it Longhorn, change its name to Vista, and upgrade their embedded Istanbul-codenamed Messenger service to include a carrier grade VoIP client. When the PC boots, and the desktop populates, a softphone will appear in the corner. Click and dial.

And the customers? They ... just ... want ... more.

These forces - Skype and Vonage, Yahoo! and Google, Virgin Wireless, Microsoft, and the customers – behave like biological viruses. They infect and multiply, and the world around them changes as a result. In concert, devices converge, get smaller, become more capable. Desktop phones now integrate IP-based Web browsers. Mobile devices combine full-function PDAs and phones and connect to the network at high-speed. Vendors roll out Wi-Fi telephones, further facilitating convergence over the enterprise network and offering untold bypass opportunities.

This is a time of blurring lines. The consumer and enterprise markets bump and rub against one another as corporations send waves of employees home to work, erasing the line between enterprise and consumer. These Small-Office/Home-Office (SOHO) workers, together with the burgeoning small-to-medium business (SMB) market, create demand for centralized service quality delivered over a fully distributed network to increasingly remote workers. Follow-me and find-me services, sometimes called 'presence applications,' become highly desirable as mechanisms for logical convergence.

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At roughly the same time the convergence of IT and telecom nears completion. In the enterprise, where VoIP has become widely deployed, voice has morphed into “just another data application.” It is, after all, nothing more than a sporadic contribution of packets to the overall network data stream, and with the broad deployment of edge bandwidth and digital compression an increasingly small percentage of that data is devoted to voice. As this realization dawns, CTOs throughout the enterprise domain make a bold move: They issue mandates that cause their IT organizations to absorb the functions and responsibilities of their historically dedicated voice service organizations. This move does two things: It formalizes enterprise recognition that VoIP is *clearly* an enterprise application and further recognizes that *voice is not*. Consider this: the packets emerging from a traditional data application such as e-mail are remarkably forgiving of delay and jitter because the asynchronous application that creates and consumes them is equally forgiving. If the message is delayed in its arrival by an additional ten minutes, for the most part no one cares. On the other hand, E-mail is extraordinarily intolerant when it comes to packet loss. The loss of a single packet can result in catastrophic data corruption.

Voice, on the other hand, has precisely the opposite behavior. The human ear is such a poorly engineered listening device that 40% packet loss can often go undetected. But introduce 30 milliseconds of delay into the packet stream and customers become surly.

Equally problematic is the fact that we now have a group managing voice *that knows nothing about voice*. We have all seen this broadcast message appear on our desktop or laptop PC:

E-MAIL SERVER C030TY7 WILL BE BROUGHT DOWN IN FIVE MINUTES FOR EMERGENCY MAINTENANCE. PLEASE SAVE YOUR WORK AND LOG OFF. ESTIMATED TIME OF RESTORAL: ONE HOUR.

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We shrug our shoulders, grumble a bit and amble down to the cafeteria for coffee. But imagine what happens when this message appears instead:

THE VOICE SYSTEM WILL BE BROUGHT DOWN IN FIVE MINUTES FOR EMERGENCY MAINTENANCE DUE TO A WORM THAT HAS PASSED THE FIREWALL. PLEASE HANG UP. ESTIMATED TIME OF RESTORAL: ONE HOUR.

I suspect that this message will engender a very different response than the first one. It's one thing to be without e-mail for an hour; it's another thing entirely to be without voice. The availability of never-failing, carrier-grade voice is a deeply inbred expectation; once it becomes "just another IT application" a different picture will have to be painted.

So the coming together of voice and data is a powerful and compelling thing as far as the customer is concerned. For the service provider, however, the result is a complex architectural and logistic problem, the management of which is not optional. Many companies have jumped on the VoIP bandwagon, but not always for the right reasons. Rationale ranges from "gotta go VoIP because it's cool" to "huge reduction in expense" to "unified messaging." Implementers, however, must never forget one thing: *Voice is the application. VoIP is a technology option.* The sounds that emanate from a standard telephone and the sounds that emanate from an IP-based device are identical. Customers don't convert to VoIP because of that oh-so-cool stream of packets emanating from the handset. The decision, therefore, to go with a VoIP solution must be based on a clear and emotionless understanding of the inner workings of a typical telephone network, how it differs from a VoIP network, and the pros and cons of each.

The power that comes from a wisely thought-out telecom strategy is all



about
knowledge:



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knowing why you are choosing to evolve, *knowing* what to expect, *knowing* when to make the change, *knowing* how it will all happen, *knowing* where the technology, service, application, human resources and management changes will take place, and *knowing* how to respond to them all. There's a wonderful line, reputedly from Alice in Wonderland, that says, "If you don't know where you're going, any road will take you there." And of course the only way to know where you're going is to know where you've been. In response to that, an old quote from the Texas cattle drives seems appropriate: "When you're driving a herd to market, take a look back now and again to make sure they're still there."

Next in line is the inevitable growing interest in OpenSource software. The industry goes public – and free. LINUX takes the operating system world by storm and does damage to Microsoft's firm grasp on the enterprise server world. XML becomes the de facto standard for data representation in the IP world, soon spreading beyond. And in October 2004 in New Delhi, at a meeting of semiconductor manufacturers, STMicroelectronics stunned delegates by announcing that the firm would make public one million lines of code to the industry at large, the first step toward a single standard for chip design that has come to be known as Generalized Open Source Programmable Logic (GOSPL). Valued at \$150 million, 77% of attendees agreed to use the standard.

Next comes a tectonic industry shift as computers come of age and with them the gaming industry. 2010 appears to be magical because in that year, around the world, 450 million homes will have broadband and there will be one billion VoIP connections. Processor speeds will increase eight-fold from where they are today, and because storage grows twelve times faster than processor speeds, the average PC will have a terabyte of onboard storage in 2010. *That's four years away.*

The battlefield, long waged in the access domain, moves to the living room as IPTV takes root and players jockey along the ramparts. Microsoft and Alcatel

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form a strategic alliance to create the first commercial IPTV platform. And with this movement of the battlefield comes a new army: The Millennials arrive, and with them a redefined industry.

So here we are. The industry has been taken apart, examined, revamped, put back together. Instructions from the market are clear: Out with the old and in with the new, but down with the price and up with the services. I'll buy, but on my terms.

Next Steps

So what does this portend for the industry at large? One thing that is clear is that the old measures of success no longer apply. Consider the following list.

From circuit switching to circuit routing. An often-heard phrase in telecom is that “we’re going from circuit to packet.” This is certainly true to a point, but the statement is just sloppy enough to leave a major question unanswered. As the network evolves to an IP construct, we do not abandon circuits along the way, because circuits are fundamentally important to the delivery of quality-based service. What *is* happening is a move from *physical circuits* to *virtual circuits*. We still ensure a logical end-to-end flow; we just do it in a different fashion.

From traffic that responds to the network to a network that responds to the traffic. In line with the prior comment, the move from circuit to packet brings about a major relationship change between the network and the traffic it transports. In circuit switching, a physical path is established on an end-to-end basis over which all traffic must pass – in effect, the traffic must respond to the network. In packet environments, however, the opposite is true. As packets arrive at nodes within the network, the network reads the destination of each packet using a variety of techniques and *adapts to the requirements of the traffic*.

From “wireless and wireline” to “access.” As the Millennials become more influential and as the market-at-large becomes more aware of the enhanced

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capabilities of the network, the line between wireline and wireless will slowly disappear as customers demand simply *access*. If the network has the ability to adapt to *me* instead of the other way around, I shouldn't matter what access modality I have – in theory the network should be able to find me, interrogate whatever device I'm using, and download the appropriate material in the right format.

From MVNO to MVNE. As Virgin, ESPN, Disney, 7-Eleven and other MVNOs succeed with their new models of network-free service delivery, a new focus emerges, this time on the backroom systems that enable high-quality service delivery to the customer.

From mobility to ubiquity. Both mobility and ubiquity are important constructs in the emerging model of network utilization, but they are not the same. Mobility implies the ability to connect to the network via a wireless local loop, whether it be EV-DO via CDMA, EDGE via GSM, or pure IP via WiFi or WiMAX. Ideally it offers predictable high bandwidth, dependable connections, and secure transmission.

Ubiquity, on the other hand, implies the ability to connect to the network anywhere, anytime, regardless of the characteristics of the loop. Ubiquitous access may include wireless as an option, but also includes wired solutions such as Ethernet, T-1, and DSL.

As I observed earlier, customers are not looking for the next great “killer application,” but rather for a “killer” way to access the applications they already have - because those applications offer solutions to most of the challenges they encounter. Consider, for example, the typical business user. As long as they are in their home office environment, wired connectivity is perfectly acceptable for both voice and data. When they leave the office and get in the car, *mobile telephony* becomes important. Mobile data has no application (thankfully!) in the car other than for those applications optimized for that

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environment – OnStar service, for example, or GPS-based guidance systems, or specific applications related to public safety. If, however, the user stops for coffee before going home and decides to check e-mail one last time, *ubiquitous* connectivity, whether wired or wireless, provides value to the user from a data perspective while *mobile* telephony remains valuable for voice. An RJ-45 connection on the tabletop is just as serviceable as a Wi-Fi connection, not to mention far more secure and predictable.

Ultimately, *mobility* defines the characteristics of a *lifestyle choice* that involves networking, whether personal or work-related. *Ubiquity* defines the *characteristics of the technology infrastructure* required to support the mobile lifestyle. “Anywhere, anytime connectivity” has become the chanted mantra of the mobile user, and while Wi-Fi is the most loudly proclaimed option, it is *not* the *only* option. This, I believe, is part of the reason that revenues associated with Wi-Fi remain elusive. It is sexy, cool, and functional. But of those three characteristics the only one that has revenue potentially associated with it is *functional*, and there are too many alternatives to wireless that offer lower cost, greater security, and more predictable connections. Until a service provider comes up with a compelling argument for Wi-Fi's performance superiority, the only companies that will make money on it will be those building wireless access points and routers.

From QoS to QoE. Service providers are driven by the quality of service they deliver. The measures are well known: five nines of reliability (99.999%), carrier-grade, toll-quality, mean-time-to-repair, mean-time-between-failures, and so on. Notice, however, that *none* of these measures are meaningful to the customer because they are all network focused. *The result* of these measures should have bearing on the customer, and should therefore drive a very different measure of service quality delivery: Quality of Experience. Quality of Experience is an outwardly-looking measure and should include measures of the degree of positive change in the user's interaction with the network and the

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service provider behind it. A network that is available 99.999% of the time has no value to the user if the databases that they wish to access are not available.

From a network-aware user to a user-aware network. This statement lies at the heart of IMS. Today, the customer must be constantly aware of the eccentricities and limitations of the network and must adapt his or her behavior accordingly – hence separate phones and numbers at home, at the fax machine, at the office, on the mobile, on the second line. With IMS comes a new model, a model in which the *network* adapts to the *user*. A single number works for all devices, and the network “senses” the user’s current situation and modifies its service delivery approach accordingly. What concept!

From broadcast content to unicast content. As companies, services and device converge, demand for varied content delivered to a broad array of devices grows accordingly. Customers want to receive *their* content on *their* device, regardless of location – network bandwidth permitting, of course. Furthermore, they want to have the option of downloading only that content which they are motivated to pay for. In the new world of networking, the network will host a database of preferences and will only download those programs that the user wants to see, with the profile easily modifiable by the user.

From access to the network to access to my stuff. Along the same lines we have a growing recognition on the part of the customer that they don’t view the network the same way the network service provider does. To the service provider, access means ‘access to the network.’ To the customer it means ‘access to my stuff.’

From data-centric user to user-centric data. As sophisticated (and largely automated) Customer Relationship Management capabilities creep into the network, a shift in the role of data occurs. The user is data-centric because their interactions with the network require them to be. For example, I carry my laptop not because it makes me look impressive but because it has all my data on it and I need access to those files. Once the level of sophistication of the

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network climbs to the point that it becomes user-aware as described earlier, a shift to *user-centric data* occurs. At this point databases are mined, analyzed and acted upon, creating knowledge that the service provider can use to increase sales and maximize the stickiness of the customer.

From recurring charge billing to transaction-based billing. Perhaps the single greatest untapped opportunity within the telecom/IT space is the need to rewrite billing and operations support systems. Today most service provider Operations, Administration, Maintenance and Provisioning (OAM&P) systems are based on a recurring charge model and the assumption that most customers care little for call detail records. This assumption is flawed, however, particularly among enterprise customers and the emerging Millennial market sector. A strong interest in transaction-based billing has emerged and service providers will be forced to adapt their systems to it. For example, many subscribers want to be billed for connect time, for number and size of downloads, and so on. Consider the immense success of iTunes and other services like it. This is a *massive* opportunity: the first company to demonstrate its ability to “granularize” its billing model will enjoy long-term customer loyalty.

From regulating technology to regulating the experience. Regulators have recently “revamped” their approach to their responsibilities, thinking as much about the ultimate customer experience as the details of the regulated components. One change element is an increased focus on the *result* of the delivered service. This results in both an internal and an external view of the regulated environment.

Recipes for Success in the IMS World

So what comes out of all this discussion? As we enter the world of an IMS-dominated network environment, all players, most notably the manufacturers and service providers, must take certain key steps to drive a different relationship between themselves, their served markets, their regulators, and the technologies they develop and deploy.

The Service Providers

We begin with Service Providers. These companies must:

NOT consider the roll-out of a new product or service before they answer four critical questions:

- Will it raise the customer's revenues?
- Will it reduce the customer's OPEX and CAPEX costs?
- Will it stabilize or enhance the customer's competitive position?
- Will it mitigate the downside risk a customer faces as they operate in an increasingly competitive marketplace?

Develop a culture of regulatory compliance if they are to survive.

STOP focusing on preservation of access lines and minutes of use and START focusing on preservation of customers.

Let go of technology as a differentiator.

Accept the fact that in the new technology business model, they can have some of the money or none of the money. To that end they must learn to enter into alliances and partnerships that don't involve hegemony.

Pay a great deal of attention to the Millennial Generation. They will soon be the most important and influential employees, customers and competitors these companies have.

Chart a path toward becoming a content provider – and must recognize that they already are. Voice is the single most important content component of all.

Stop trumpeting the value of their solutions. Instead, they should first strive to make the market understand that they know what the problems are.

Develop a comprehensive telecom/IT attack strategy, given that telecom is being subsumed by IT in the enterprise space.

Challenge the existing paradigms: local loop, application demand, mobile requirements, customer demand.

Challenge everything by asking, at every turn, these three questions: “What’s it for?”; “Why are doing this?”; and “Are you sure?”. Then and only then can service provider be sure that they are ready to proceed to the next step.

Consider the nature of the ideal access appliance – or appliances.

The Manufacturers

Meanwhile, the manufacturers must:

Take the lead by reorienting compensation plans so that rewards are paid based on customer satisfaction and solution effectiveness rather than on sales levels of the “product du jour.”

Create a “Chief Integration Officer” whose organization is tasked with the functional elimination of product line silos. See [Figure 2-9](#).

Become a contractor or architect. Their product is business problem resolution; the tool is the combined efforts that they and their business partners offer.

Recognize that wireline and wireless are not distinct product lines. They’re access, no more and no less. If you disagree, ask a Millennial.