Stimulating Residential Telephony

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In our recent article, "Digging Out of the Hole: Thoughts on Re-Initializing the Telecom Industry" (see *BCR*, April 2003, pp.14–15), we argued that the U.S. economy can afford to spend more on telecom services, and that the industry needs to focus more attention on demand stimulation and less on supply-side concerns. We suggested a process in which companies should:

- Think about what new services would trigger a substantial increase in primary demand, without getting hung up over existing technology or short-term financial constraints.
- Then concentrate on how to provide the necessary delivery platforms economically. What infrastructure and content is needed, at what price points?
- Lastly, figure out how to make the right infrastructure and content available faster, and jettison development activities that don't contribute to demand growth.

In this article, we turn our attention to how this approach might help to revitalize residential telecommunications, with particular focus on the local exchange carriers. Our starting point is that residential telephony needs a makeover, based on the following:

- The number of residential telco phone lines is dropping.
- Toll revenues are under attack from "any-distance" mobile phone plans, as well as severe competition between interexchange carriers (IXCs) and regional Bell operating companies (RBOCs).
- Cable modem has gained substantial broadband share versus telco digital subscriber line (DSL) service. Telcos don't have a strong competitive answer to cable TV service.
- Residential service is far less profitable than (and is subsidized by) business service.

First, Some Numbers

As shown in Table 1, if there is a poster child for demand stimulation, it's residential telephony. While the publicly available numbers come from a variety of sources and for different years, we estimate that the size of the total residential market is $204 billion, with average household spending around $172 a month ($2,058 per year) on various services. For households subscribing to all services, the average monthly spending is $186 ($2,237 annual). This translates to 2.8 percent of total personal consumer expenditures.

That $2,237 annual spending number for a full-bundle subscribing household is large enough to support an infrastructure of considerable size. If, for example, depreciation runs as high as 20 percent of a telecommunications provider's revenues and a 10-year depreciation cycle is used, a capital outlay of $4,274 per subscriber could be justified for these different services.

However large the overall residential pie, telephony has a surprisingly small and declining share. Cable's revenue market share is substantially larger (42 percent share versus 33 percent), with cable doing better by a 2:1 margin in broadband Internet access. The cable industry's market share would be even higher if we included $12.2 billion in advertising revenues and $2 billion in "other" revenues.

So, far from being the big boy on the block, telephony is an also-ran, losing share as next-generation services expand. This reinforces the need for telephony service providers to remake their service offerings.

Some Blue-Sky Thinking

So, what's the right answer for residential telephone service providers? Forgetting for the moment about enabling technologies and cost economics, a compelling next-generation offer would stimulate primary demand *and* allow telcos to compete effectively with cable and wireless players—forcing those competitors

TABLE 1 Estimated Current U.S. Residential Telecom Market Size

	Subscribers (000)	Total Annual Revenues ($mm)	Monthly Revenue ($)
Wireline Telephony (Residential)			
•Local Telephony	99,100	$41,622	$35.00
•Long Distance	99,100	$21,406	$18.00
Total Wireline Telephony	**99,100**	**$63,028**	**$53.00**
Cable/Satellite TV (subscriber revenues excl Internet & Telephony)	**89,623**	**$73,763**	**$68.59**
Wireless (Residential Portion)	**94,140**	**$39,539**	**$35.00**
		$0.485	$0.723
Internet Access			
•Switched Dialup	52,000	$12,480	$20.00
•Broadband-Cable Modem	16,100	$9,660	$50.00
•Broadband-DSL	7,900	$4,740	$50.00
•Broadband-Satellite/Wireless	1,300	$780	$50.00
Total Internet Access	77,300	$27,660	$29.82
Total Residential Market	99,100	$203,990	$171.54
For 100% subscribers			$186.41
Breakout by Provider Type			Percent of Total
Total Telephone Provider		$66,609	32.7%
Total CATV/Satellite Provider		$84,582	41.5%
Total Wireless Provider		$40,319	19.8%
Internet Access Provider		$12,480	6.1%
Total Providers		$203,990	100.0%

Sources: Wireline data from *US Trends in Telephony* survey for 2000. Cable data from US census info for 2001; assumed satellite revenues per subscriber equivalent to CATV. Wireless data from CTIA December 2002 survey. Assume that 67% are residential customers (consistent with wireline); $35 average ARPU versus $75 for business accounts. Internet access broadband data from a January 2003 Strategy Analytics report estimating broadband penetration by year-end 2003.

to respond with infrastructure investments of their own. Here's what such an offer could include:

1.) Provide *mega*-broadband to the home. Forget about anemic DSL service with a few hundred kilobits per second selling for $50–$150 per month. Even though it's a lot better than switched dialup, it doesn't fundamentally change anyone's way of life.

For one thing, today's residential DSL offerings do a poor job of providing video to the home. You can't transmit a single VCR-quality video in real time on a 256- to 768-kbps DSL line, let alone receive DVD-quality video or high-definition television (HDTV).

And don't forget that for most households, transmitting a single TV channel isn't enough. The average household consists of 2.62 people and has 2.4 TV sets, meaning each person effectively has his/her own set; and the average person watches six hours of TV every day (Source: U.S. Statistical Abstract).

So if you want to support "real" household TV viewing, you need to support three HDTV-quality video streams simultaneously. At 20 Mbps per HDTV channel (compressed), that means you need 60 Mbps to support your family's TV addiction.

On top of that, let's assume that each of your three TV sets is being watched by someone who is simultaneously using a laptop hooked into an 802.11 wireless LAN, to facilitate multitasking while watching TV (this happens in many households). For really good Internet performance while watching television, let's add an incremental 20 Mbps of bandwidth, since video streaming involves a continuous bit stream with zero down time. This additional transmission capacity also might be used to support network video gaming, as an incremental service.

In addition, if we have good broadband connections, we would want to support high-resolution two-way video telephony. Add another 20 Mbps for that—since we will need upstream as well as downstream capability.

Net-net, residential households need more bandwidth than the 200 kbps in each direction that the FCC defines as "Advanced Services." We think the right number is more like 100 Mbps downstream and 20–40 Mbps upstream. Since the phrase "broadband" has been co-opted by service providers offering 256-kbps service, we use the phrase "mega-broadband" for the bandwidth we advocate.

2.) Provide video streaming to the home. Bandwidth without killer software or content is not particularly useful. If the single greatest use of bandwidth in homes is video, then we need to provide customers with the ability to get the programs they want, at the resolution they want, when they want it.

This means that telcos must provide networks that facilitate video streaming from video servers and/or Internet video websites. The system must be sufficiently robust to permit transmission of multiple video signals into a single home simultaneously.

The functionality of this video streaming should be different from (and superior to) what's provided by cable TV or satellite providers, taking advantage of mega-bandwidth capabilities in a way that current cable TV infrastructure cannot match without substantial upgrades. (cable TV operators also are trying to migrate to a switched network, where the switching is done at headends, and the TV interface could be Ethernet.)

For one thing, the systems should be able to handle HDTV as well as current-generation NTSC, letterbox as well as standard TV. The viewer should be able to select the desired format.

Second, the system should allow the end user to select which content he/she wishes to receive (eventually with a user agent profile, potentially multiple agents for each person). In the current CATV model, the service provider controls the channel allocation. As a result, to get to what you want to see, you have to click through lots of home shopping channels, golfing channels, cooking channels, foreign language broadcasts, along with lots of slots for pay-per-view and adult movies. Unless you're a foreign language-speaking sex fiend addicted to home shopping, there often is surprisingly little on cable worth watching.

Third, access to content should not be limited to video server selections. If a customer wants access to more esoteric content (say a Bulgarian language channel originating in Sofia), he/she should be able to access video originating on non-local video websites, transmitted over the Internet via IP multicast. This capability opens the available content range infinitely.

(One alternative to switched video is TiVo, which lets you pre-record content for later viewing, and can provide commercial-free viewing. However, the offering is limited to your cable provider's channel selection. We therefore see TiVo as a useful addition to switched video, not a substitute.)

In addition, our ideal system would allow end users to program which content appears on which channels, and therefore, on remote controls. On the local Boston CATV station, CNN is on 17, Fox is 34 and MSNBC is 37. It would be nice to put them next to each other! Ditto for the various movie channels. Conversely, it would be great to get rid of home shopping channels entirely (at least in the authors' homes). This would make channel surfing a much more pleasant experience.

Similarly, the system should support enhanced TV guide viewing. The channels on your guide should reflect the channel assignments you have made. The scrolling of channels should be stored in memory and start from the top when you select the channel, rather than wasting lots of time scrolling through PPV and other channels that you have no intention of watching.

3.) Develop a shared 802.11 network. Given that many subscribers will have mega-bandwidth service, this will provide the wireline telcos an opportunity to compete with wireless players—by hopping on the Wi-Fi bandwagon and using it as a high-bandwidth/low cost alternative to mobile wireless. The availability of this wireless application will attract even more subscribers to the mega-bandwidth service.

Here's how it would work: Telcos would encourage mega-bandwidth customers (residential and business) to install 802.11 high-speed Wi-Fi transmitters. Telco mega-bandwidth customers would place the transmitters on their own sites and make the units accessible to their fellow subscribers—thus giving everyone a new mobility application for their service.

To make this work, there would need to be authentication codes for "guests," combined with firewall protection for the local Wi-Fi subscriber. On the other hand, since each of the sites will be mega-bandwidth, the extra bandwidth required for use by "guests" should not be an issue. Where it occurs (perhaps in a downtown business district), the telco could arrange for additional free bandwidth to be provided.

To the extent that the service provider permits access to business accounts, it

could charge these customers an access fee that could reduce the net connectivity cost to residential customers.

4.) Develop a dual-mode wireless voice capability. A ubiquitous network of Wi-Fi hotspots also lets us attack the wireless voice market with a mobile phone capability. The idea in this instance would be to give people a dual-mode wireless phone that would test for the availability of a Wi-Fi hot spot and route the call on the lowest-cost route.

In send mode: If Wi-Fi were available, the phone would access the Internet and work as a voice-over-IP (VOIP) phone, probably provisioned with Session Initiation Protocal (SIP). If Wi-Fi is unavailable, the phone would work as a standard mobile telephone on one of the legacy wireless networks.

In receive mode: The service would periodically (and automatically) test for the availability of a Wi-Fi net. If Wi-Fi is available, the system would route the call over the wireline/Wi-Fi network. If there is no Wi-Fi, the telco would route the call over the cellular/PCS network.

The advantage of this idea is that many calls will be routed over the wireline network at low marginal cost—increasing the value of the wireline network and taking away revenue from the wireless network operators.

This also means that the RBOCs would be cannibalizing existing wireless business, and taking away much of mobile's growth potential. However, we think that an attractive wireline offer will generate more revenue dollars for the parent company when cross-share elasticity is taken into account (i.e., an SBC mega-bandwidth offer taking away share from AT&T Wireless, Sprint and Nextel wireless). Also, if the RBOCs don't embrace Wi-Fi, new market entrants like Cometa will.

Pricing And Revenue Impact

If the goal is to develop a compelling offer package that stimulates consumer demand, it has to be priced "right." What might this look like? In general, we have the following views on pricing:

- If the new service provides meaningful new functionality, consumers will pay more for it, so long as the marginal utility is substantially higher than the incremental cost.
- Pricing should be *activity-based*. If most of the cost of a telecom network is fixed, based on peak-load provisioning, then prices should be high fixed cost and low marginal cost.
- If marginal costs are low enough, telcos need to eliminate metered usage and adopt fixed all-you-can-eat pricing (*a la* Internet and CATV pricing). This clearly will be much more attractive to consumers.
- For different services involving separate incremental costs, there will need to be separate pricing for each service. However, each service needs to be priced attractively versus competitive offers.

Consistent with these guidelines, here is our pricing offer (with the caveat that a real marketer would do lots of research before going public):

- Start with a mega-bandwidth pipe as the core offer—$100 per month (more likely, $99.95) for 100 Mbps would be attractive to middle-class customers, because it is the key to facilitating a dramatic improvement in meaningful functionality. For price-conscious customers, charge $50 for a 5–10-Mbps connection, comparable in price to current cable modem/DSL service, but much faster. This would include instant messaging services, which would have the potential to encompass video and graphics, not just text.
- Next, charge extra for video provisioned via the mega-bandwidth connection, since the service provider will incur additional costs associated with video servers and content fees.

For a basic selection of non-premium channels plus ability to access video websites, the price would be $40, which compares favorably with the $50 that Comcast charges in Boston. For access to premium channels like HBO, there'd be a higher fixed-price fee, and a per-view fee for PPV content.

On balance, the average fee for premium service would be something like $80 per month, comparable to $100 per month for standard cable but with the advantages discussed earlier.

Bundling TiVo-like services with this offer (i.e., via a central server) could make it even more compelling. However, this might get hijacked by litigation from

TABLE 2 Prospective Next-Generation Residential Telephony Offer Elements
(With High/Low Household Usage Levels)

	Monthly Fee	Low-end Household Usage	High End Household Usage	Low End Monthly $ Per Household	High End Monthly $ Per Household
Mini-broadband	$50	1		$50	
Mega-Broadband Connection	$100		1		$100
Cable-Video Streaming Service	$40	1		$40	
Premium channel cable video streaming	$80		1		$80
Wireline SIP Phone Service (per phone)	$30	1	2	$30	$60
Wireless SIP Phone Service (per Phone; 1/3 residential)	$50		2		$100
Video Gaming	$5		1		$5
Total Wireline Per Month				**$120**	**$345**
Mobile Wireless Service-Basic	$25	1	1	$25	$25
Mobile Wireless Service-High Usage	$50		0.4		$20
Total Mobile Wireless (Residential)				**$25**	**$45**
Total Residential Per Month				**$145**	**$390**

Hollywood over the right of consumers to make copies for personal use, where those copies are being saved and stored on a commercial server.

- Next, add VOIP-based wireline telephony service, transmitted over the mega-bandwidth pipe—$30 per phone line for unlimited, any-distance calling would be a highly attractive offer.
- For people who want transportable phone capability, provide a dual transportable cordless/mobile wireless phone capability, in which consumers would have a SIP phone that would work as a cordless. There'd be a fixed-price contract to connect to a Wi-Fi hot spot (via Bluetooth), and the phone would also work as a cellular phone based on a fixed-bucket contract. (Mobile phone service would be obtained by reselling service from one of the national footprint players.)

We would charge $50 for a Wi-Fi-capable cordless phone; that's $20 more than for a fixed phone, but the transportable phone would be reachable through any Wi-Fi hotspot on the network. We assume that people would continue to pay for mobile contracts (for places not served by Wi-Fi hotspots) at $25 per month, with road warriors paying $50 for much higher usage.

- Video gaming might have a surcharge of $4.95 per month, or it might be a revenue split with the video game service provider.

Adding this up, we estimate that a low-end household would spend $145 per month on service, while a high-end household would spend $390 (Table 2). If the mix is 50/50, the average would be $267.50, or 56 percent higher than the current $172 average.

Market Potential

Obviously, not everyone is going to take the new offer, but what would happen if they did? Assuming 50 percent high-end/50 percent low-end mix and 100 million households, the overall market potential would be $321 billion—excluding advertising revenue and potential revenues from business users wanting access to our residential Wi-Fi network This is 57 percent higher than our $204 billion current market estimate, and would translate into 4.5 percent of personal consumption expenditures (versus 2.9 percent currently).

Of course, some people won't subscribe to the mega-bandwidth offering, preferring to stick with their current POTS-centric services. We'll address variable take rates in our practical business case analysis in a future article.

On top of the main revenue stream, there could be substantial opportunities for hosting valued-added services such as unified messaging and Web servers. In addition, a transformation on this scale in residential telephony presumably would result in a similar change in business demand. But that's for another day as well.

Impact On Market Share

In the short-term, the impact on market share could be substantially greater than the primary demand effect. We earlier estimated that wireline telcos have a 35 percent share of the total residential telecom services revenue market. With the type of transformation envisioned here, that share could rise substantially.

Of course, if it did, CATV operators would be forced to counter, by investing in their own new infrastructure—perhaps using a Gigabit Ethernet architecture. The wireless carriers would need to improve the attractiveness of their data offerings and drive prices down. That's what competition is all about.

But What About Real-World Costs And Returns?

We started this article by stating that we would suspend judgment on whether our proposed product offering was economically feasible. After all, with enough Moore's Law doublings, *anything* becomes feasible, eventually.

Having said this, the issue of timing, of course, is critically important. We'll have more to say regarding technology and economic trends in future pieces. Stay tuned!□

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Companies Mentioned In This Article

AT&T Wireless (www.attws.com)
Cometa (www.cometanetworks.com)
Nextel (www.nextel.com)
SBC (www.sbc.com)
Sprint (www.sprint.com)