

SPECIAL FOCUS

Quadruple Plays from the Edge: The Long Tail of Voice & Video

EDGE, NETWORK BATTLES BUILDING. The telcos and cable have been developing “triple play” and now “quadruple play” bundled offerings to fortify their positions. Now, Web-based edge providers are using software applications to provide their own voice, video, data, and mobile offerings, seeking to aggregate a “long tail” of niche markets. While the two fronts have yet to merge, we believe edge forces will increasingly affect the cable-telco battle of the bundles. We do not believe the edge players represent an existential threat to the network owners, but they do represent a competitive force that can limit pricing power and undercut market advantages. In this report, we examine key network-edge dynamics, and offer a survey of what the edge providers are up to.

- In the near term, edge providers are not likely to go after the core products of the broadband network owners.
- However, edge providers will likely limit the pricing power for time/distance-based or high-margin services.
- Edge providers will likely target long-tail markets and have various advantages: global reach, faster innovation, economics that scale, advertising that works better, and greater data on consumer Internet behavior.
- Such competition will likely make it harder for broadband networks to capitalize on economies of scope.
- Edge competition will likely increase the leverage of device manufacturers.
- Integrating the customer experience and moving to wireless will be among the key battlefields, in our view.
- Edge providers seek regulatory policies that create network neutrality and more numerous and robust broadband services, while the networks seek deregulation of their services and maybe some edge regulation.
- The survey of edge voice, video, data, and mobile service initiatives begins on p. 7.

There are two great battles going on that will determine the winners and losers in who gets the best returns for delivering voice, video, and data services to Americans, in our opinion. The first is between those who own the physical networks. The core participants are cable (e.g., CMCSA, TWX, CHTR, CVC, MCCC) and telco players, most notably the Bells (VZ, T, BLS, Q), but they are also challenged by satellite and wireless players. As discussed in a report of ours several years ago, these players are racing to achieve the greatest economies of scale and scope, as they transition their networks from offering one service terminating on one device to a network having the capability to offer multiple services to multiple devices (see “Battle of the Bundles: Packaging of Services to Accentuate Two-Wire Dominance,” June 2002, published by Legg Mason Wood Walker, Inc., the prior owner of part of the Stifel Nicolaus Capital Markets business). The first big battleground was broadband, and the resulting competition has led to broadband now displacing narrowband as the primary way Americans access the Internet.

In the early years of this battle, participants talked about the need to have a “triple play” of voice, video, and data services as the best way to keep the customer. In assessing the current market dynamics, one now has to also consider the role of mobile services, so the talk is increasingly about who can provide the best “quadruple play.” But no matter how one characterizes the number, the concept of the bundle has gone from theory to reality and is at the heart of all these companies’ concern over how to increase profit-

ON DECK.

Oct. 12: FCC plans vote on AT&T-BellSouth. Deal also being considered by DOJ. Some seek delays until judge concludes review of DOJ actions on previous Bell-IXC deals, so could still be some slippage. FCC also to vote on net-neutrality inquiry, unlicensed use of broadcast “white spaces,” and 700-MHz interference issues (Qualcomm petition).

Looming:

- Judge to decide on EchoStar distant signal injunction.
- High court to decide whether to review cases on FCC wireless preemption of states.
- Eighth Circuit ruling on FCC’s *Vonage* VoIP order preempting state regulation.

All relevant disclosures and certifications appear on p. 14 of this report.

ability. We believe the ability of cable to offer three services over its existing facilities has led to increased valuations; the need for telcos to upgrade to be able to do the same has driven their capital expenditures; and the concern over the DBS/satellite-TV players (**DTV**, **DISH**) basically having only a video offering has driven all kinds of speculation about new investments and transformative transactions, as well as lowered their stocks.

As this battle intensifies, another battle is really just getting started. That is the battle between Web-based edge providers that can offer various voice, video, data, and mobile services through software applications, rather than through their ownership of a transmission network. Google (**GOOG**), Yahoo! (**YHOO**), eBay (**EBAY**), AOL (**TWX**), Apple (**AAPL**), Microsoft (**MSFT**), and lots of smaller companies correctly see the growth in broadband penetration as their opportunity to seize a greater market share with various applications and are now beginning to provide voice and video offerings in addition to their data services. These primary edge providers are engaging in their own battle at the edge in another version of the battle to be the leader in triple or quadruple play services. These two battles are both in their early stages and, to date, they have not morphed into a single battle in the marketplace. Despite all the hoopla, it is cable that is starting to take significant voice revenues from telcos, not Google Talk; and while the fact that edge providers are getting into video shows signs of a fierce battle for advertising revenues, it does not threaten the traditional multichannel video revenues of cable and DBS, as the telcos hope to by entering the video market.

From a financial perspective, the battles are still largely separate for many reasons, but one of the most significant is the historic difference in the way the two different groups collect revenue. The network owners' battle of the bundle tends to be a fight over monthly subscriptions for various services. The battle at the edge, while in the early days of narrowband was also over monthly subscriptions, now tends to be about advertising revenues, transactional revenues, and niche product sales. The landscape, though, is changing. Of particular note, in our view, is the ecology of innovation at the edge. The product cycles

<i>THE SKINNY</i>			
Proceedings	Status	Outlook	Update
Telecom Reform (Franchising, USF, Net Neutrality, Broadband/IP, etc.)	Congress looks to ease video franchise rules. Network neutrality major obstacle. FCC sorting out various issues.	Statutory overhaul a tough sell, though telco-cable broadband parity is increasing. VoIP faces some regulation.	Prospects for lame-duck action still depend on GOP keeping bicameral control, which took a hit this week. FCC eyes net neutrality inquiry.
Intercarrier Compensation & USF Regulation	USF subsidies and fees coming under increasing stress due to various factors, including wireless and VoIP bypass.	FCC eyes USF contribution changes, hopes intercarrier consensus emerges, but may focus on phantom traffic, other steps.	None.
State & Local Video Franchising, Muni-Broadband	States considering various bills to ease telco video franchising, regulate muni-broadband, and/or address telecom generally.	Bell franchise push has fair amount of momentum. Muni-broadband and telecom reform prospects appear mixed.	California Gov. Schwarzenegger signed state franchise bill into law, as expected.
Wireless, Satellite, and Spectrum	Wireless industry seeks more spectrum and fewer regulatory burdens and costs, including state and local.	Wireless carriers gradually gaining more access to spectrum; regulatory fight waxes and wanes.	EchoStar and DirecTV file joint comments urging FCC to create a nationwide license for auction in 700 MHz band of returned broadcast spectrum.
Indecency & Tiering/À La Carte	Legislation enacted to hike maximum FCC broadcast indecency fines tenfold.	Cable/satellite rules unlikely for now, but parties likely will be pressured on tiers.	None.
Media Ownership and Consolidation	FCC eased media ownership rules, but stayed in court and Congress modified TV cap.	Related new deals complicated, given court ruling.	FCC gets an earful from opponents of industry concentration at media ownership hearings in Los Angeles.
Intellectual Property	Tech companies fight it out over patent rights while digital content owners and distributors engage in copyright battles to seek more share of value chain.	Litigation will continue to play a significant role in its own right and also as a pressure point for parties seeking leverage to achieve business objectives.	Court grants EchoStar stay of injunction pending review in TiVo patent suit. Qualcomm loses bid to block Broadcom from shipping chips Qualcomm claims use stolen trade secrets.

are far faster, the rise and fall of new companies far more dramatic, and the cost structure of innovation far cheaper than that of the traditional telco and cable worlds. Thus, from an investor perspective, even if one is only focused on the broadband network players, it becomes important to watch these early battles at the edge, to gain insight into two longer-term questions. First, what are the assets needed to obtain sustainable leverage in the markets for voice, video, data, and mobile services? And second, how will the battle on the edge impact the battle of the bundles?

The purpose of this report is to offer analysis of what we believe are the key dynamics, which provide insight into the answers to those questions. After providing that analysis, we provide a survey and charts (starting on p. 7), summarizing the kinds of offerings the edge companies have been providing along with a brief discussion of the key issues in each category.

KEY DYNAMICS

The possibility that edge players could threaten the revenues of network owners is not new. As we noted in an earlier report on this subject (“Microsoft: A Triple Play of Its Own”, November 9, 2004, also published by Legg Mason Wood Walker, Inc., the prior owner of part of the Stifel Nicolaus Capital Markets business), in 2002 SBC Communications (now AT&T) warned in a court filing in the Microsoft litigation that the software giant had the potential to compete in (or to use SBC’s legal language, “effectively destroy free consumer choice” in) a broad range of businesses that use “electronic means of communication — such as telecommunications services, Internet access, voice messaging, instant messaging, video and music services, e-commerce, interactive games, to name a few.”

SBC’s fears of Microsoft’s dominance have not been realized. For one thing, Microsoft has met far more competition from other edge players than SBC’s lawyers (and many others) anticipated in 2002. Moreover, from our perspective, the battle that the SBC lawyers were really writing about, between networks and edge providers, is still nascent: we are still in the early stages of determining who will control “the bottleneck that both gives businesses in these critical related markets (whether established or still emerging) access to potential customers and gives consumers the means to reach the providers that they choose to deal with.”

But we think that battle is starting to change and intensify. There are lots of trends driving that change, but we believe the biggest one is the move to broadband access. Another is a very competitive dynamic among the edge providers in their efforts to keep customers on their applications. Ironically, in our view, one of the reasons SBC’s lawyers may have been wrong in their predictions of Microsoft’s dominance was that due to Microsoft’s position in the operating system market, it may have not been as aggressive in attacking other markets. This created an opening for others, such as Google and eBay, to fill.

We think this has given Microsoft a new sense of urgency to drive some of the applications we discussed in our earlier report. We note that in a speech this August, Anoop Gupta, vice president of Microsoft’s unified communications group, said that unified communications was not a high priority for Microsoft three years ago. That is changing and the results are expected to be seen in new Office 2007 software that is scheduled for release around the same time as the new Windows Vista operating system. Mr. Gupta put Microsoft’s opportunity this way: “(t)he way I look at it, there are 400 million people using Office today. I believe there’s plenty of money to be made by solving the communications issue for these users.”

THE (M&A) MATRIX				
Transaction*	FCC Status**	Prospects	Key Issues	Update
AT&T-BellSouth FCC Docket Number: 06-74	<u>Clock: Running</u> <u>Day One: 4/21/06</u> <u>Days Left: 11</u> <u>Target Deadline</u> 10/17/06 <u>Formal Comment</u> <u>Period: Closed</u>	Likely to be approved with conditions. Judge’s Tunney Act review of previous Bell-IXC mergers a complication, particularly on timing.	Similar concerns as in 2005 Bell-IXC deals, with added horizontal concentration issues.	FCC plans to vote on transaction at Oct. 12 meeting, though some lawmakers seek DOJ delay until judge concludes Tunney Act review, which could still affect FCC timing.
* The FCC has a fairly open process, but the deals are also subject to DOJ (or FTC) antitrust (and sometimes state) review. ** The FCC clock and target dates create an internal timetable, but can be stopped and extended.				

OVERVIEW OF EDGE SERVICE OFFERINGS				
Provider	Voice	Video	Data	Wireless
eBay	* Skype	* None	* Leading auction and shopping services * Leading online payment system	* SkypeZones
Google	* Google Talk	* Segments	* Portal Utilities	* Mobile Gmail * Google SMS * Mobile Maps
AOL	* AIM & AIMPhoneline	* Segments	* Internet Access * Portal Utilities	* Multiple AOL Services * AIM and AOL Mail * Phone and service purchase
Yahoo!	* Yahoo!Messenger	* Segments	* Portal Utilities	* Mobile Messenger * Yahoo! Photos
Amazon	* None	* None	* Largest bookseller/Internet retailer	* None
Apple	* iChat	* iTunes / Segments	* iTunes * Quicktime * Podcast format	* Developed phone with Motorola, but reportedly developing iPhone
Microsoft	* Live Messenger * Microsoft Communicator (Office)	* DRM * WMP 11 * WMV HD * Segments	* MSN / Hotmail * IE 7 * Office 2007 * Windows Vista	* Windows Mobile suite of software
Vonage	* Vonage (PSTN-type service)	* None	* None	* WiFi Phones (hotspots)
SunRocket	* SunRocket (PSTN-type service)	* None	* None	* None

Source: Stifel Nicolaus Telecom, Media & Tech Regulatory Research, company data.

No doubt, the broadband network owners, particularly the telcos, feel they are the ones most likely to solve the communications issue for those 400 million and others. No doubt other edge providers, such as Skype (**EBAY**), AOL, Yahoo!, and Google, feel the same. And what is true for communications is becoming increasingly true for entertainment and other video-related services, as well. The battle over bundles of voice, video, data, and mobile services is no longer the sole province of those who own networks.

We have surveyed the edge offerings (see above chart for overview) to examine their potential impact on the market. In reviewing the quadruple play efforts of the edge providers, and considering their impact on the quadruple play of the network providers, we believe the following points represent some key dynamics for how the future will play out.

1. **In the near term, edge providers are not likely to go after the core products of the network owners.** We see the core product of the telcos as local network access (though we note it is becoming a smaller percentage of the revenues). We see the core product of cable as basic and expanded-basic tiers of video services. We do not see the edge quadruple play efforts as competing for those products, nor likely to tempt material numbers of consumers to turn off their local phone service or their basic cable service because of the opportunity to use edge services. The services — unlike, say Vonage's (**VG**) — are not being marketed as direct competitors, nor are they likely to fill the same needs as those core products. Indeed, we expect they will generally be seen as complimentary and in some cases beneficial, as some services, such as IP video, are likely to be big drivers of consumer demand for faster broadband provided by cable and the telcos.

2. **However, the edge providers will likely limit the pricing power for time/distance-based or high-margin services.** While the edge plays probably will not compete with the core cable and telco products, which in both cases represent bundles featuring unlimited use, the edge plays should reduce the pricing power for any service whose price is based on time or distance, and probably discrete high-margin businesses. As pricing based on time and distance reflects historic business strategies, rather than marginal economic costs, and as the edge providers have few costs based on time and distance, those products represent the greatest opportunities for the edge players to offer low-priced alternatives, in our view. Plummeting long-distance rates are the clearest example. In addition, any discrete service whose price is significantly greater than marginal cost — such as international calling, 411 services, or video on demand — represents a target, as the edge providers can find ways to offer similar, and in some ways superior, offerings at a lower cost to themselves.

3. The edge providers will likely go after the long-tail markets — aggregations of niche markets — and have significant advantages in addressing those markets.

In the recent business best-seller *The Long Tail*, author Chris Andersen makes the case that the big economic impact of the Internet is that it enables a “long tail” of markets: the aggregation of many niche, geographically dispersed, small markets. He suggests that prior to the Internet, sellers had to focus on the large market opportunities. For example, book distributors had to focus on the top sellers. The average Barnes & Noble (BKS) store carries 130,000 books. Amazon (AMZN), by contrast, gets more than half of its revenues from titles outside its top 130,000 sellers. Mr. Andersen’s research suggests that if you combine enough small markets, you can create an aggregate market larger than the traditional market. We think Mr. Andersen’s analysis is useful to understanding how the edge players are approaching the voice, video, data, and mobile markets. Rather than directly confront the traditional large markets of the incumbents, they are trying to address what are sometimes thought of as niche markets. These include such services as 411, Yellow Pages, click-to-call, conference calling, and access to videos with appeal to very small audiences. Some of these services are variations of traditional services; some are efforts for new forms of communications (such as Skypecasts). The edge players can attack niche markets more easily than the incumbent markets for a number of reasons, including the following.

a. *They have an international footprint.* One limitation in the pre-Internet world was the need to find a local audience for a product. The Internet allows one to sell a book anywhere in the world, so the 5,000 people needed to justify publication can be scattered all over instead of in a few key markets; a key to success in an Internet world is to be freed from geography. The edge providers have that freedom, as all have essentially international footprints. Their innovations scale around the world. The network owners, by contrast, are largely limited to the network footprint.

b. *They have faster cycles of innovation.* As software can quickly change and has long been a highly competitive market, the edge providers are used to cycles of innovations measured in months. By contrast, it takes years for an innovation to be built out through a physical network, and, in addition, the network owners faced limited competition up until a few years ago; thus, the network owners are used to innovation cycles measured in years. Further, the Internet ethic of “anything worth doing is worth doing badly” (bring new offerings out quickly, even if badly, to test the market and keep improving it in subsequent iterations) means that edge players are far more focused on innovations than the network players, who recoil at the idea of doing anything badly.

c. *The economics scale better and the advertising subsidies will likely work better.* Particularly to the extent edge providers use P2P technologies, they have the advantage of adding extra customers at little or no marginal cost. They don’t have to subsidize devices, dig a trench, install equipment, or spilt a node to add a customer. The edge providers also have an advantage in having expertise in enabling advertising to targeted markets, which can subsidize the service.

d. *They have greater access to data about consumer behavior on the Internet.* The Internet is the greatest collection of aggregate data about the activities, desires, and interests of humans ever invented, in our view. The edge players see more of that data (both in the aggregate and the particular) than the network providers. As a result, they are more likely to understand where there are niche opportunities for new services and how to attract and serve customers interested in such niches.

4. Competition over the long-tail markets probably will eventually make it more difficult for the network owners to capitalize on economies of scope for future services.

As noted above, the network owners will likely continue to benefit from economies of scale driven by consolidation. They — particularly cable — are benefiting from economies of scope in offering new services over existing facilities. While we think there are still economies of scale and scope to be squeezed out of the existing telco and cable plant, it will be harder in the long term, in our view, as a number of niche products that could have easily added high-margin incremental revenue at little to no incremental cost, will face competition from edge players.

5. Competition from the edge will likely increase the leverage of device manufacturers.

A particularly underappreciated dynamic, in our view, is the way the edge quadruple play is probably good news for device manufacturers. There are two basic reasons. First, device manufacturers generally benefit from shorter product cycles. If everyone upgrades their cell phone every two years instead of three, that is a huge increase in the number of phones sold over time. As noted, innovation at the edge tends to be much faster than network innovation, driving the kinds of increased functionalities that could lead to shorter product cycles. Second, as the edge providers compete to get favorable positions on devices — such as their software clients on the Dell (DELL) laptop or the Nokia (NOK) phone — the device manufacturers benefit from greater leverage vis-a-vis the edge players and the service providers. This is not to say that services providers, such as wireless players, that have traditionally had significant leverage in negotiations with equipment manufacturers will lose all their leverage. It is simply to note that Nokia is in a stronger position in its talks with, say, Verizon, when Verizon knows that Nokia is also looking at an economic opportunity to benefit from adding a Skype client to its phone. In this regard we note that Nokia has said that it expects that in 3-to-5 years all of its phones will be able to connect to the Internet through WiFi, which we expect will help drive new demand, new applications for the phones, and new leverage for Nokia.

6. **Among the key battlegrounds are integration of the customer experience and the move to wireless.** As noted above, over the near term, we think the edge players will mostly be providing niche services that will largely be complimentary to the network owners, though they will also undercut the network owners' ability to benefit from some niche services. Over time, however, as more and more applications are developed, we believe there will be an increasing premium placed on integrating the customer experience across networks and across devices. The telcos and cable have an advantage in the ownership of the physical networks. This has helped them combat churn, as customers do not like to change equipment or learn new systems, as is sometimes required. The edge players have the advantage of greater experience in developing customer interfaces in a competitive field, in our view, and are also better at creating sticky *applications*. So while the network owners' bundle has some very sticky elements, as applications become more robust, and integrating them in a consumer-friendly manner becomes more important, the edge providers' prowess in creating sticky applications may give them an advantage. These include lists of favorites, address books, and other features that do not move as easily as a phone number. Ultimately, both edge players and the network owners will be competing for the position Microsoft currently enjoys on the desktop: control of the first screen of the primary device people use to connect to the Internet. This leads to the second battleground: the mobile device. Certainly, from the global point of view, the primary device connecting to the Internet in the future is more likely to be a mobile device than a traditional computer. Again, consumer access to a company's services through that device will prove critical to the company's ability to maximize the value of various applications. Thus, the edge providers and the network owners are both scrambling for some leverage in that playing field. While the network owners, again, have some advantages in owning some of the networks, the edge players have the advantage of scaling services internationally and of a competitive dynamic in wireless that is greater than in other facilities-based communications markets. In this regard it is worth noting that edge players are quickly moving to a world where on a mobile phone they will have their own bundle of voice, multimedia content, location-based service and payments (such as PayPal or Checkout). As this happens, the competition between the edge players and the wireless service providers should become a much bigger issue.

7. **Regulation will affect the playing field, with edge providers advocating policies to create network neutrality, more broadband alternatives, and faster speeds, while network owners generally seek greater deregulation for themselves and, possibly, some regulation for edge providers.** For the last year in the United States, we have witnessed a rather ferocious battle over network neutrality. One of the curiosities of the battle was that both sides were arguing about hypothetical business models. Advocates for network neutrality — generally the edge providers — argued that rules were necessary to avoid anti-competitive behavior that might occur in the future. Opponents said the rules were unnecessary, as the kind of

Broad Regulatory Issues: Edge vs. Networks		
Issue	Positions	Outlook
Broadband Deployment	Edge players want policies favoring more broadband players and bigger pipes. Incumbents generally on other side but don't mind greater government support for build-out.	Mixed. Issue will be raised in various settings, such as: * Municipal broadband; * Use of white spaces in broadcast spectrum; * 700 MHz auction; * Universal service support for broadband.
Network Neutrality	Edge players want rule banning broadband discrimination of IP applications; broadband network owners want no rules restricting use of network.	Explicit or implicit rule looks to be no blocking or degradation, but government unlikely to adopt prior constraints on broadband-IP deals. Key question is how networks use control to leverage value in video market.
Universal Service	Incumbents, particularly RLECs, will seek to broaden base of financial support. Some will support numbers-based mechanism.	Universal service payment duties will continue to encroach on previously unassessed areas. Numbers-based system could reduce margin on click to call.
Content Fights		
* Copyright	Content owners want strict protections; others want broader "fair use." YouTube shaping up as big test.	Burden likely to fall on edge providers to control.
* Indecency	Family groups will want indecency rules for Internet Protocol video.	It may be on TV but First Amendment issues are very different and courts unlikely to apply broadcast-like indecency standards to IP video.
* Kids	Some will argue for broadcast-like rules for children's advertising.	Hard to regulate but a few horror stories would make for big congressional hearings and eventual regulation.
* Political	Use of political videos will highlight some issues raised by blogs about whether the videos are political contributions.	Fact specific but, like blogs, political videos will likely prove hard to regulate.

Source: Stifel Nicolaus Telecom, Media & Tech Regulatory Research

behavior fretted about would not happen. What neither side said precisely (and with good reason) was what their business models in the future would be. The next important question, in our view, is not what the government is going to do but what the companies are going to do. As noted here, we do not believe the edge players represent an existential threat to the network owners (though alternative networks might); however, they do represent a competitive force in limiting pricing power in some markets. So the network owners will have the incentive — though not necessarily the means or the market power — to leverage their network ownership to favor their offerings. But this is not the only policy battle that will shape how the network owners compete with the edge providers. There will be a series of proceedings that affect broadband deployment; edge players will want incentives and opportunities for more broadband networks and bigger pipes. Network owners will focus their policy efforts on leveling the playing field in ways that either create deregulation and tax freedom for themselves, or impose similar burdens on edge players. (see summary chart on previous page). While it is early, we think the network owners will generally be more successful in their policy efforts, in part because the market success of the edge-based players will likely create more sympathy for the arguments of the network owners, giving them some traction.

A SURVEY OF EDGE MARKET SEGMENTS

In this section, we survey key developments and issues affecting the edge players' quadruple play, service by service. We focus mostly on the voice and video side, as those segments have the greatest implications for network-based quadruple plays.

I. VOICE MARKET

Edge Players Move IM into Voice. Instant messaging (IM) technology has been the primary driver of growth in live Internet communications. Thus far, AOL, Yahoo!, and Microsoft have together accounted for the vast majority of the IM market, with Google and Apple serving much smaller markets. These edge applications have been constantly fighting for the biggest community base, with AOL leading the U.S. pack.

A Heavy Weight on the Edge — Lack of Interoperability. In the short run, the most powerful limitation weighing down the IM client use of the edge providers is the lack of interoperability between programs. The companies report well over 530 million IM accounts, and ComScore claims that there are 339 million unique IM users (almost 50 percent of worldwide Internet users). The value of this customer base (far larger than, for example, the customer base of all the U.S. cable companies combined) is limited by the lack of interoperability. New interoperability standards are beginning to reach the market, however, as the edge providers continue their fight for dominance of Internet communications. In July, Microsoft and Yahoo! announced text-chatting interoperability between the new Yahoo! Messenger with Voice and Windows Live Messenger. This creates a user base of nearly 300 million users. Apple and Google have built their chat clients (the software that enables the service) on open standards, allowing for any new programs developed using such standards to freely connect to Apple's or Google's servers. This combines the top two IM clients, but the open standards alliance still lacks the necessary interconnection protocol to make it a robust voice service. At the recent VON Conference in Boston, a panel of edge players all discussed how increased interoperability between their IM platforms was the key to further growth on the IM platform.

Adding Voice. We believe the next front of the IM fight will be waged over voice capability. Built using the same principle as eBay's Skype product, each of these Web services has released an IM software client that can perform PC-to-PC calling. Across the board, this service is free; once users download the new version of IM software, they can make a voice "call" to anyone in the world using the same version of the software. The edge providers are marketing this as "no new hardware needed," meaning that anyone with a computer, microphone, and speakers can communicate using their software. eBay has, through Skype, the greatest market share of PC-to-PC voice communications, with over 100 million users. AOL, Yahoo!, and Microsoft have the most popular IM clients worldwide, but it remains to be seen if the current IM community base automatically translates to the greatest voice community base. One key limiting factor is that users can only make free calls to those on the software's user base. As noted above, Microsoft and Yahoo! expanded their user base by creating an interoperable platform, but the IM platform is still significantly less ubiquitous than the public switched telephone network (PSTN). Google, whose Google talk product has only garnered about 3 million users, has been struggling to play catch-up.

PSTN Interconnection? Four of the clients, Yahoo!, eBay, Microsoft, and AOL, also offer interconnection with traditional PSTNs for nominal fees. As shown by the Edge Voice Offerings chart (see next page), eBay, Yahoo!, and Microsoft charge about 2 cents/minute, for using a computer to call an ordinary U.S. phone, whereas AOL's AIM Phoneline Unlimited charges a flat \$9.95/month for unlimited calling to PSTN phones. Any of these clients can interact with foreign PSTNs as well, and although rates vary by country, service in most Western European countries and other developed countries is available at cheap rates in the range of 2-to-4 cents per minute. Phone-to-PC dialing is offered by Yahoo!, eBay, and AOL, with each of

EDGE VOICE OFFERINGS

	Google	Yahoo!	eBay	AOL	Apple	Microsoft	Vonage	SunRocket
Name	GoogleTalk	Messenger with Voice V.8	Skype	AIM Triton	iChat	Live Messenger	Vonage	SunRocket
Type of Client	IM	IM	Voice w/IM capability	IM	IM	IM	VoIP	VoIP
Latest Release Date	April 7, 2006	June 20, 2006	June 14, 2006	June 29, 2006	March 29, 2006	June 19, 2006	Current	Current
Community User Base	886,000	22 Million	100 Million	53 Million	DNA	27 Million	1.6 Million	Near 100,000
Product Stage	Beta	Beta	Full Release	Beta	Full Release	Full Release	Full Release	Full Release
# of Plans	1	3	3	3	1	2	4	2
Ad-based	No	Yes	No	Yes	No	Yes	No	No
Operating Platform	Windows	Windows	Win., OS X, Linux	Windows	Mac OS X	Windows XP	N/A	N/A
Availability	Worldwide	Worldwide	Worldwide	Worldwide	Worldwide	Worldwide	U.S. and Europe	75% of US homes
Languages	12	6	27	6	15	Many	N/A	N/A
Cross-Communication	Open/Jabber & AIM	Microsoft Live Messenger	None	None	Open Standards	Yahoo! Messenger	PSTN	PSTN
File Size	1.23MB	2.65MB	10MB	398K	3MB	15MB	N/A	N/A
Promotions	N/A	--	Yes	Yes	N/A	--	Yes	Yes
Payment Methods	N/A	Prepaid Card	Prepaid Card	Miscellaneous	N/A	Prepaid Card	Credit/Debit	Credit
PC-to-PC Fee	Free	Free	Free	Free	Free w/ OS X	Free	--	--
PC-to-Phone Plan	--	Phone Out	SkypeOut	AIM Phonenumber Unlimited	--	Verizon Web Calling	--	--
Fee	--	\$0.02 / min**	\$0.021 & Up*	\$9.95 / month	--	\$0.019**	--	--
Phone-to-PC Plan	--	Phone In	SkypeIn	AIM Phonenumber	--	--	--	--
Fee	--	\$2.49 / month	\$38 / year	Free	--	--	--	--
Phone-to-Phone Plans	--	--	--	--	--	Incl. w/ Office Communicator	Unlimited Plan	Unlimited Plan
Fee	--	--	--	--	--	--	\$24.99 / month	\$24.99 / month
							500 Outgoing Min.	200 Outgoing Min.
							\$14.99 / month	\$9.99 / month
Notable Integration	Gmail	None	None	AOL Portal Services	.Mac services	MSN/Hotmail	--	--
Emergency Serv./E911	No	No	No	No	No	No	Yes	Yes
Videoconferencing	No	Yes	Yes	Yes	Yes (3-way)	Yes	No	No
Voicemail	No	Free	\$20 / month	Free	No	No	Free	Free or \$3 / month
Text Messaging	Info SMS only	Info SMS; PC-to-Text	\$0.031 & Up*	Yes	No	Yes	No	No
Extra Hardware Needed		Speakers and Microphone OR Optional	Headset (for better sound quality)				Phone Adapter	SunRocket Gizmo
Other Features	Interaction with Gmail	File Sharing, Photo Sharing, Games, Search, Radio, Skins, Themes, Integrated Address Book/Contacts	File Transfer, Call Forwarding (Skype), Conference Calls, Ringtones, SkypeZones (WiFi)	Caller ID, AIM Locator, File Transfer, Contact Sharing, Photo Sharing, E-mail integration (2GB)	.Mac Services, H.264 video codec, Parental Controls, Corporate IM	File Sharing	Call ID, Call Waiting Forwarding, 3-way Number Portability	Call ID, Call Waiting Forwarding, 3-way Number Portability (Cable)

* Destination-dependent

** Price for 30 countries, then destination-dependent

Source: Stifel Nicolaus Telecom, Media & Tech Regulatory Research, company data.

these companies providing a dedicated phone number in any area code desired. For this feature, Yahoo! charges a flat fee of \$2.49 per month and eBay charges about \$4 per month but the AOL service is free. Google and Apple also offer PC-to-PC calling, but have yet to integrate PC-to-Phone or Phone-to-PC calling.

How Does This Compare to Vonage, SunRocket, & Cable? For simple voice calls connecting two IM users on broadband-connected computers, IM clients cannot be beat on price. They are free whereas Vonage, SunRocket, and the cable companies charge monthly fees similar to, though generally less than, the incumbent phone companies. This, no doubt, is the big reason that eBay/Skype's voice service has 113 million users, over 50 times the number of the likes of Vonage and cable companies, which individually claim less than 2 million subscribers. Furthermore, for international calling, the IM clients cost the consumer far less. For the same PSTN interconnectivity, including two hours of calls to France per week, a consumer using an edge-based service will pay about \$120 per year compared to about \$850 for the same voice service over a PSTN phone (see "Americans Calling to France" chart on next page). But for the millions of Americans who choose to use an old-fashioned telephone to connect to hundreds of millions of people at higher cost, Vonage and cable/telco providers have VoIP products that offer a lower-priced alternative to traditional telco offerings.

The E911 Dispute. Inherent technological limitations make IM providers offering 911 emergency dialing or any emergency automatic-locating service a difficult and costly proposition. This forces the Web portals to disclose that the new service cannot be used for such purposes and is therefore not a replacement for a traditional telephone service. Cable emphasizes this difference in its marketing, noting that its service is absolutely a replacement for an existing telephony service since it is compatible with all E911 (enhanced) services. Vonage sits in the middle of the dispute as E911 availability depends upon where the user is located, though Vonage and others have greatly extended the reach of E911 since mandated by the FCC last year.

The Next Frontiers: Devices and Click to Call. We think the next big developments in voice may be driven by competition between edge providers to develop non-computer devices that carry calls and to develop click-to-call functionality. As to the devices, there appears to be a significant number of customers that simply do not want to use the computer as a phone. In response, some of the edge players — particularly Skype, which has struck deals with, among others, Phillips and Sony — are

"AMERICANS CALLING TO FRANCE"							
	AOL	Yahoo!	eBay	SunRocket	Vonage	Comcast	TWC
Per Minute	\$9.95/mo	\$0.015	\$0.021	\$0	\$0	\$0.09	\$0.08
At 2 hours per week, 52 weeks	\$119.40	\$93.60	\$131.04	\$0	\$0	\$561.60	\$499.20
	+	+	+	+	+	+	+
Monthly/Yearly local # charge	FREE	\$2.49/mo			\$24.99/mo	\$24/mo*	\$30/mo*
	FREE	\$29.88/yr	\$38/yr	\$299/yr	\$299.88/yr	\$288/yr	\$360/yr
Total Yearly Cost	\$119.40	\$123.48	\$169.04	\$299**	\$299.88**	\$849.60	\$859.20
Description: Cost to an American consumer who has full PSTN interconnectivity and places two hours of calls to France every week.							
* Cost of package with digital cable, high-speed Internet, and digital voice, less cost of package with only digital cable and high-speed Internet.							
** Use plans and package configurations for the lowest price of above model.							

Source: Stifel Nicolaus Telecom, Media & Tech Regulatory Research, company data

striking deals with handset manufacturers to develop phones that enable P2P calling without being tethered to a computer. We expect this trend to pick up steam. A big uncertainty is whether Apple finally produces the long-rumored iPhone, which could impact a variety of voice markets. Just as Apple used the iPod to become a central player in the ecology of mobile entertainment, they might be able to extend that franchise by adding voice and other communications functionalities to a device. We also think there will be important developments in the click-to-call market over the next several quarters. Click to call offers significant financial opportunities to the edge providers, as it creates a new revenue stream. While a call to an advertiser is worth significantly more than a click to a Web site, the edge provider has no way to collect for the call. If click-to-call functionality is easily available, and can be monitored (such as by having a separate phone number that reflects the origin of the ad) the edge providers stand to gain. This has two additional benefits for the edge providers. It creates a model in which calls are paid for in relationship to their value; a model that may have broader uses. And it creates an entry way for integrating voice communications across a broad spectrum of edge services. In this regard, the Google-eBay deal over the summer was particularly important as it represented a way for both companies to accelerate their efforts to offer this service to advertisers. Further, we see it as an indicator of how the companies may address the problem of "coopetition" — figuring out how to collaborate with a competitor. In this case, both sides essentially conceded the other's edge play by relying on the other's stronger asset (Google agreeing to use Skype for voice communications and eBay agreeing to use Google advertising) to move both companies forward faster.

Key Issues. We do not believe that in the near term, the edge voice services discussed herein threaten core voice revenues (which we see as largely the monthly fees for local access of the telcos, and increasingly, cable players). The desire for ubiquitous connectivity remains strong. And there are significant advantages to offering a bundle of services to keep the customer with the incumbent companies. But we believe the threat to other revenues, and eventually the core revenues, will grow. First, the edge services already are taking away some revenues. A canary in the mine is the international market. Skype already takes, by some accounts, 7% of global international calls. The reason for Skype's success in that market is that international calling is priced well above economic cost to the provider and thus is a logical candidate for bypass.

There are a number of other discrete candidates for such bypass. These include per-minute long-distance charges, 411 directory-service calls, and vertical services such as voice messages, call forwarding, and call waiting. These have historically been high-margin services. Edge-based players will likely find them attractive targets. Among the most underappreciated, in our view, is the opportunity to take on 411 service, in part because such service can be offered from the edge in a variety of ways at a much lower cost, and in part because it lends itself to an advertising model that edge providers are comfortable with and know how to exploit.

Moreover, we believe that the edge providers (the recent innovators of information and communication technology) have substantial leverage for making further inroads into tomorrow's IP telephony market. Adding voice service to existing IM clients seems to be the easiest approach to gain voice market share for two reasons. First, there is a huge, existing consumer base of over 300 million IM users and over 694 million Internet users. Second, the primary users of IM software are younger generations, who are much less resistant to change and who will, therefore, be much more likely to adopt new calling methods and phones instead of holding a traditional, wired receiver to their ear.

In addition, when comparing IM-voice clients to standard PSTN VoIP services, such as Vonage's or SunRocket's, a key issue is accessibility; are consumers willing to give up the traditional phone setup for a PC-based setup? While startup VoIP companies like Vonage are struggling to add subscribers in the face of telco dominance and increasing cable entry, the Web providers offering voice services through IM are likely to see a greater increase in the number of users due to their free/cheaper pricing model. Furthermore, all the IM clients (with the exception of Apple's iChat and Google Talk) are ad-based, therefore leading the way for much greater revenues from the hundreds of millions of users. The infrastructure and the business models of Vonage, cable, and the telcos do not lend themselves to such advertising revenues.

A big question mark is who is most likely to solve the puzzle of integrating various voice, video, and data services. As applications and devices proliferate, there is a need for services that integrate the services and devices in a consumer-friendly manner. On the one hand, the bundlers have an advantage. As they will control the networks behind the three key screens (televisions, personal computers, and wireless devices), they should be in the catbird seat in terms of integrating the services, such as having caller I.D. show up on the television set when one is watching, or enabling a downloaded video to be played on the wireless mobile device. But this is largely a software problem, so it may be that the edge providers are in the best position to come up with solutions that customers flock to.

II. VIDEO MARKET

Over the last six months there has been a flurry of activity regarding Internet video. For a more comprehensive view, please see the note by our colleague Scott Devitt ("Online Video: Beginning of Long Move Up S-Curve of Innovation and Monetization," June 29, 2006). In this section we survey some of the activity by the key edge providers.

Short Clips Prevail. The four top portals (Google, Yahoo!, AOL, and Microsoft) differ slightly in the content they offer, but they primarily deliver miscellaneous short video clips and highlights free of charge. These short clips include music videos, news highlights, movie trailers, and sports clips. All portals except Google provide free Music videos and movie trailers, and AOL and Microsoft also offer short news and sports clips at no charge.

Ad-based Content. Yahoo!, AOL, and Microsoft are able to offer their content for free since the product is ad-based. Before viewing each music video or clip, for example, the user must sit through a 15- or 30-second video ad. After the mandatory ad has run, the player automatically forwards to the selected clip. Apple and Google, however, have taken a "pay per download" approach. Both offer a preview of the material (often about 30 seconds), and then require payment so that the user can download the segment to a computer for infinite playback. The Edge Video Offerings chart (below) illustrates the various pricing schemes — price varies depending on the type of clip, especially at Google Video — but Apple usually adheres to a common pricing structure of \$1.99 per segment through its iTunes software. Yahoo! positions itself in the middle ground: in addition to the free, ad-based music videos, it offers a monthly or yearly price to view the same content at higher quality and without ads.

Premier Content. The area where the video providers are beginning to really differentiate themselves is premier content,

EDGE VIDEO OFFERINGS					
	Google	Yahoo!	AOL	Apple	Microsoft
Name	Google Video	LAUNCHcast	AOL Video	iTunes	MSN Video
Cost of Primary Service	Free	Free	Free	1.99 / item	Free
Full-Length Content:					
TV Shows	1.99	No	Free	1.99	Free Clips
Music Videos	1.99	Free	Free	1.99	Free
Movie Trailers	No	Free	Free	No	Free
Full Length Movies	\$9.98 & Up	No	No	No	No
News	No	No	Free Highlights	No	Free Highlights
Comedy	Limited	No	Free Clips	No	No
Sports	\$0.99 & Up	No	Free Clips	No	Free Clips
Leading Technology	Existing Codecs	Existing Codecs	Intel VIIV	Quicktime/M4A	Windows Media Format
Ad-based	No	Yes	Yes	No	Yes
Other Video:	* Google Internet search for video	* \$3.99 / month for ad-free subscription with extra content and high-quality audio	* AOL Hi-Q Video: DVD quality programming but Windows XP only and with limited content	* Quicktime Format * Podcasts: limited content currently	* WMV HD * DRM * WMP 11
Web sites	video.google.com	music.yahoo.com movies.yahoo.com	video.aol.com	iTunes software	video.msn.com

Source: Stifel Nicolaus Telecom, Media & Tech Regulatory Research, company data

namely mainstream TV shows. Apple has led this market as the only Web provider to offer over 150 shows for download with frequent additions to the collection. The shows are often available for download the day after first airing on broadcast TV at a price of \$1.99; Apple has had over 35 million TV shows and music videos downloaded. The company is also currently in talks with major Hollywood studios — and it has already struck a deal with Disney — about including full-length feature films in its iTunes lineup, which, in the same manner as TV shows and music videos, could be downloaded for playback on either an iTunes computer or on a video iPod. Google, too, is moving into the premier TV content market with numerous popular shows such as *CSI* and *Survivor*, at the Apple price of \$1.99 per segment.

The Quality Trade-off. There is a significant difference in video quality between the free content and the pay content. Yahoo!, AOL, and MSN stream at medium resolution, which takes up only a small part of the screen. Of these three, AOL has by far the best streaming quality — good enough that full-screen viewing does not overly distort the image. But the pay videos from iTunes and Google Video have much better compression and much higher resolution, allowing for almost TV quality viewing.

The Upstarts Get Upstarted. While the major players were all rolling out Internet video platforms, so were a number of new players. To date, instead of Google Video or Yahoo! challenging traditional media, what has happened is new players, particularly YouTube, have become the leaders in distributing Internet videos. Much like Yahoo! and Google in their early days, YouTube does not have a clear business model. Nonetheless, it shows that the market for edge-based services and applications is not closed and the big edge players will have to continue to innovate to maintain the leads they have in other markets. It does raise an interesting question about why and how the big players did not grow market share in this segment as fast as some new entrants. One could focus on a number of potential explanations (for example, big players have to be more concerned about legal issues like indecency and copyright or the big players did not allow the videos to be integrated into other sites as easily) but a significant implication, from our perspective, is that while the edge players have developed some expertise on making their core applications sticky, they have not yet been able easily to transfer that stickiness, or the power of their brands, to adjacent markets.

But this in no way is to suggest the big edge players are out of the video game. Rather we see the recent developments as another example of the Internet mantra “that anything worth doing is worth doing badly.” Again, in the Internet world, innovation comes by doing things quickly, even if badly, seeing if a market develops, and then if it does, improving the product until it is ready for prime time in the mass market. This is in contrast with the network world, where established companies believe they have only one opportunity to roll out a product and thus spend whatever time is necessary to bullet-proof the product for all contingencies. For example, Comcast waited a long time before it rolled out its VoIP product, for fear that if the service did not work well, from the start, there would be no second chance. The video upstarts were under no such burden, but we think there is certainly an opportunity for others, including the larger players, to make the kinds of improvements in quality that move the market to their offerings.

Key Issues. Currently, edge providers do not have the content or capability to seriously challenge traditional multichannel video subscription services. Cable, satellite-TV, and, sometime in the not-too-distant future, telcos have an advantage in video simply due to the consumer’s accessibility to high-quality broadcast and multichannel content, including live sports. As we do not think the government will impose significant anti-discrimination requirements on the network owners, at least not for awhile, the cable industry and the Bells may be able to shift leverage in their direction through how they prioritize video packets. Furthermore, there is greater demand for traditional television in lower-income households, which less often have the resources to adopt brand-new technology offerings. These lower-income households are more likely to be among the minority of Internet customers who still subscribe to narrowband Internet (or have no Internet access at all), and, thus, do not have the technical capability to retrieve bandwidth-intensive content. But the biggest reason why the current multichannel video distribution model is unlikely to be challenged, at least in the near term, by Internet video is probably that the key content providers — Viacom (**VIA**), Disney (**DIS**), NBC/Universal (**GE**), News Corp. (**NWS**), and Time Warner — still prefer the current forms of distributing their content to an unbridled Internet model. The current models have a number of advantages, including a clearer revenue model and more certain protection of copyrighted material.

Video content available from the primary edge providers is plentiful but miscellaneous, meaning that it is still quite limited in scope and is nowhere near up to par with TV content. With 20,000 searchable clips, AOL Video offers the widest variety and high-quality streams of free content. Over the summer, AOL upgraded its video offerings, providing new video search tools and improved picture quality, as well as 45 new video on demand content channels from popular cable channels. Apple’s iTunes offers the biggest selection of pay content and is the most popular media download program. Yet, neither of these companies offers anything near what one might consider a comprehensive library of videos.

As with voice, we do not see the video offerings by the edge providers as a direct assault on basic multichannel video distribution revenues, but rather a niche assault on specific revenue streams. Television enjoys large advertising revenues (and for

broadcasters it is the only source of revenue — though some broadcasters hope to change that in upcoming retransmission consent negotiations). Those revenues, much like newspaper and magazine revenue, will come under assault from the edge providers. To date, television has had a bigger moat around it, as simple print ads placed next to search results or on blogs cannot convey the same power and emotion of a video ad. But as Internet video gets better, the same efficiencies that are driving a market-share shift from newspaper to Internet advertising, in our view, will likely start to affect the niche kind of advertising that the Internet is far more efficient in targeting than traditional mass media are.

Although there is a possibility that edge providers may permanently sacrifice a significant portion of video revenue streams by having to buy premium transport for their bandwidth-devouring video, we note that some are developing P2P technologies that avoid significant bandwidth costs (for comments on one of these companies, Veoh, see our note “IP-Focused Investor Day at VON Conference: Takeaways and Company Presentations,” Sept. 20, 2006). We further note that the developers of Kazaa and Skype are, according to press reports, turning their sights to video, in a manner that builds on their expertise in using P2P to address bandwidth issues). Even if there are bandwidth costs, however, we note the edge players are already innovating and developing several other sources of potential income from video. Apple is deploying products for its huge community of hardware devices users. Microsoft is offering free video in hopes of developing a customer base reliant on its Windows Media Center software and its proprietary Digital Rights Management copyright protection. AOL, too, is hoping to develop a niche by edging into home media centers. It hopes that DVD-quality video streams over the Internet, utilizing Intel’s (INTC) “Viiiv” technology, will be connected to TVs and home media centers for playback. A key threshold, in our view, is when the technology that moves videos from the computer to the television becomes cheap, and easy to operate. There are a number of technologies and companies vying to achieve this, but it has not yet become a common product. Apple’s recent announcement about a new device it is temporarily calling iTV suggests it will soon have a product on the market to address this gap. We also note that Apple is reportedly in talks with Google on using that technology in a way that might accelerate market use of transferring videos from the Web to the television.

Another key issue is how the network neutrality debate unfolds. We will not go into detail here (see our report “Net Neutrality: Value Chain Tug-of-War,” March 2006), but suffice it to say that we believe the debate is significantly about control over Internet video, as the kinds of discriminatory tactics most likely to benefit the network operators work best for applications that require high bandwidth and low latency.

III. DATA MARKET

Search Engines at Heart. Google, Yahoo!, AOL, and Microsoft are the four largest Web portals today and have built up their Internet empires with search-engine technology. In June 2006, these four portals accounted for 89.6% of total searches. Google accounted for the largest single share, by far, with 49.4% of searches, with Yahoo! in second place at 23%, MSN in third at 10.3%, and AOL in fourth at 6.3%, according to Nielsen NetRatings. It has been the portals’ ability to organize, search, and deliver relevant information that has driven their success. Now, the portals provide not only search, but also e-mail services, contact management, IM clients, live news feeds, financial information, shopping, mapping, movie and TV schedules, interactive group communities, games, and more.

The below Edge Data Offerings chart shows that the four big portals share a remarkable commonality: with a few minor exceptions, such as Google’s lack of online games or Microsoft’s lack of online groups, or communities, all big-four portals have the same 11 common components. eBay and Apple, the other two leading edge application providers, offer specialized

EDGE DATA OFFERINGS						
	Google	Yahoo!	eBay	AOL	Apple	Microsoft
Search	X	X		X		X
E-mail/Contact Management	X	X		X	X	X
Instant Messaging	X	X	X	X	X	X
News	X	X		X		X
Financial	X	X		X		X
Shopping	X	X	X	X		X
Mapping	X	X		X		X
Movie/TV Information	X	X		X		X
Local and Travel Information	X	X		X		X
Groups	X	X		X		
Gaming		X		X		X
RSS Feeds	X	X		X	X	X

Source: Stifel Nicolaus Telecom, Media & Tech Regulatory Research, company data

products but not the breadth of services offered by the above four. The one link between all six providers, however, is communication, as all offer an IM client.

Establishing Access. Yahoo!, AOL, and Microsoft offer high-speed Internet access in addition to a remaining dial-up package. AOL is phasing out its traditional access packages and is relying more upon users having a pre-existing connection, but it still has access packages available. Yahoo! has recently made agreements with AT&T and Verizon to promote their companies' broadband. Microsoft, too, has arranged to sell a variety of access through its MSN brand, and a search by zip codes brings up a variety of options including DSL, broadband, cable, and satellite.

Key Issues. Each company has a slight advantage in an area, but none of the six companies shows any sign of having a definitive lead across the board. The data applications market is unlike voice and video in that the network owners' bundles are not threatening the edge and the network owners do not have significant revenues for the edge players to attack. While the services on the edge are fighting over who performs more search and mapping requests, we see no indication that cable and the telcos are successfully generating their own similar kinds of applications (with the possible exception of online gaming). The only service which the networks provide is e-mail, but even this has not competed on the same scale as the edge. This asymmetric battle means that the edge providers have an open playing field with these applications, relative to the network providers. This could become an important advantage, particularly if these applications produce sticky consumer behavior and provide an entryway for integrating these applications with voice and video services.

As noted above in the discussion of the Google-eBay deal, we also see here a possibility of a lot of "coopetition" between edge players and network operators. Given the different asset sets, two competitors can improve both their positions by using the stronger asset of the other. For example, Verizon Wireless (**VZ-VOD**) and Microsoft teamed up in offering a music download service (designed to compete with Apple's iTunes) over Verizon's mobile devices.

IV. WIRELESS MARKET

Mobile Content. Edge providers are testing the waters with wireless services by adding content to Web-enabled mobile phones. There are four primary categories of mobile content being deployed: mail, maps, SMS (Short Message Service), and IM. Users with Web-enabled phones can access e-mail accounts from AOL, Google, and Yahoo!, with full send and receive capabilities. The same three allow Web users to send text messages (SMS) to any phone from their portal page. As an additional form of communication, Yahoo! Messenger and AOL AIM users can send and receive Instant Messages through their phones. Although Google does not yet allow Google Talk users this option, the company has created a separate mobile mapping service that displays Google Maps and step-by-step directions on any color phone.

Yahoo! is greatly increasing its mobile presence by striking deals with wireless device manufacturers. The company has agreements with Motorola (**MOT**) and Nokia to preload its Yahoo! Go software on mid-priced and high-priced devices. The Yahoo! Go software organizes contacts, photos, searching, and the Messenger and Mail clients all in one package, which boasts seamless integration with the hardware unit. Yahoo! claims that the advantage of pre-installing a software suite on phones is to decrease the reliance on mobile Web, saving the consumer time and the hassle of using a mobile browser. Google has also struck a deal with Motorola to provide one-click access to some Google services.

Microsoft has long been active in trying to get its software on mobile devices. It scored a significant win this summer when the U.S. Census Bureau decided to order 500,000 smartphones running the Windows Mobile 5.0 operating system. While this is more on the business/enterprise side than the consumer side, it could help drive greater adoption of Windows Mobile products among consumers.

A New Use for WiFi. Skype and Vonage have introduced handheld wireless devices that connect to their VoIP service through the thousands of current WiFi hotspots or through a wireless LAN router. Skype has introduced four such phones, manufactured by Belkin, Edge-Core, NETGEAR, and SMC, ranging in price from \$190 to \$250. Vonage has released one version, the WiFi UTStarcom F1000 which lists for \$130. The phones connect automatically to the network and then to the user's Skype or Vonage account.

Key Issues. In the next few years, we believe the mobile market is going to be the primary battleground where edge providers fight for dominance. A key in the past success of some edge players has been to be easily accessible on devices connected to the Internet. For example, various players fought for position on the desktop screen for Dell computers. That battle is increasingly about being on mobile devices and not just PCs. The rules for being easily accessible on a mobile device, however, are very different than in the wired world. Unlike the old narrowband communications service, mobile phone network operators are not subject to hefty non-discrimination regulations that require they permit access to their networks. Instead,

wireless carriers have much more control over what travels on their networks and, thus, what terminates in the users' hand-held devices.

Mobile search may represent the largest new opportunity for both the edge players and the wireless carriers. Carriers are eager to tap into an untouched and highly powerful mobile search market, which due to the limited nature of the networks, will likely be provided by a limited number of search and content companies. What this allows for is "point-of-presence" advertising, a market highly valuable for advertisers because of targeting potential and the immediacy of the potential purchase. "Now and here information" for purchasing will likely lead the way for a new generation of advertising revenues, in our view, but to be in the game requires being on, or easily accessible, to the screen. In this regard all the major edge players are reportedly striking deals with the major mobile players. The carriers are also striking deals with smaller players, in an effort to gain greater leverage, and obviously a bigger piece of the potential revenue stream, though the big search firms are skeptical that the smaller firms will have the infrastructure and expertise necessary to deliver large quantities of search results and advertising revenues. We note that search in the mobile world is not necessarily the same product as in the fixed world. Not only do images have to be reconfigured for a smaller screen and navigation retooled for a smaller keyboard, but, as one Google executive noted, "it's about finding, not browsing."

We believe the question of who benefits here could come down to the difference in performance between what is referred to as "on deck" and "off deck." On deck refers to data which is delivered through the service provider, in a manner controlled by the service provider. Off deck refers to data delivered over the Web; that is, the service provider connects the user to the Web and the user simply surfs for services as he or she might on a laptop over a cable modem service. Because of device and spectrum size constraints, there is currently a difference in performance, giving the service provider greater leverage. Improvements in technology may reduce that advantage. In addition, if the service providers try to exploit that advantage in a manner that raises enough concern from the edge providers, there is some chance that policymakers could bring wireless providers into the network neutrality debate.

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 Edward D. Timmons (804) 698-5999

Regional P&C Insurers/Brokers

Meyer Shields, FCAS (410) 454-4661
 Michael W. Phillips, ACAS (410) 454-4538
 Eli N. Fleminger (410) 454-4567

HEALTH CARE

Biotechnology/Life Sciences

Edward H. Nash (212) 247-4615
 Christopher M. Holterhoff (212) 247-4639

Health Care - Providers

Jerry L. Doctrow (410) 454-5142
 Robert R. Hawkins (410) 454-5595
 Anthony J. Parker (410) 454-4881
 Eric T. Gommel (410) 454-5689
 Kirk Streckfus (410) 454-5896

Health Care Services

Thomas A. Carroll (410) 454-5997
 Jamie F. Shurtleff, CFA (410) 454-5161

Medical Devices

Greg Simpson, CFA (314) 342-4042
 Kathleen McGrath (314) 342-2180

INDUSTRIAL & BASIC MATERIALS

Aerospace & Defense

Troy J. Lahr (410) 454-4828
 Hunter K. Keay (410) 454-4778

Energy Infrastructure

Ethan Bellamy (303) 291-5257
 Patrick Walseth (303) 291-5206

Infrastructure

Jeff Beach, CFA (303) 291-5246
 Noelle Dilts (303) 291-5239

Machinery and Engineering & Construction

Barry B. Bannister, CFA (410) 454-4496
 Robert Connors (410) 454-5146

Mining

Paul Forward, CFA (202) 778-4340
 Paul Massoud (202) 778-4342

Oilfield Services Equipment

R. Thaddeus Vayda (410) 454-4807

Utilities

Selman Akyol (314) 342-2158

PORTFOLIO STRATEGY

Richard E. Cripps, CFA (410) 454-4472
 Timothy M. McCann (410) 454-5333
 Michael S. Scherer (410) 454-4731

REAL ESTATE

Health Care REITs

Jerry L. Doctrow (410) 454-5142
 Daniel Bernstein (410) 454-5149

Industrial, Retail REITs

David M. Fick, CPA (410) 454-5018
 Nathan Isbee (410) 454-4143
 Joshua A. Barber (410) 454-5970

Multifamily REITs

Rod Petrik (410) 454-4131
 Tamara J. Fique (410) 454-5873

Office REITs

John W. Guinee (410) 454-5520
 Michael C. Hudgins (410) 454-4830

TECHNOLOGY

Information Technology Services

William R. Loomis, CFA (410) 454-5093
 George A. Price, Jr. (410) 454-5906
 Shlomo H. Rosenbaum (410) 454-5610
 James Harlow (410) 454-4167

Infrastructure Software

Todd C. Weller, CFA (410) 454-4316

Semiconductors

Cody G. Acree, CFA (214) 647-3516
 Patrick Newton (214) 647-3528
 W. Blake Fischer, CFA (214) 647-3514

Semiconductor Capital Equipment

Patrick J. Ho (214) 647-3509

TELECOM & MEDIA

Media & Internet

Kit Spring (303) 291-5201
 John Wren (303) 291-5208

Telecom Services

Christopher C. King (410) 454-5775
 Billie Warrick (410) 454-5662

Telecom, Media & Tech Regulatory

Blair Levin (202) 778-1595
 Rebecca Arbogast (202) 778-1978
 David Kaut (202) 778-4341

TRANSPORTATION

Trucking / Airfreight / Logistics / Railroads

John G. Larkin, CFA (410) 454-5158
 David G. Ross, CFA (410) 454-5164
 Matthew S. Grady (410) 454-5316
 Michael J. Baudendistel (410) 454-4725

Linda M. Olszewski (410) 454-5255
Research Marketing/Media Relations

Kathleen W. Shipley (410) 454-5778
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Research Marketing