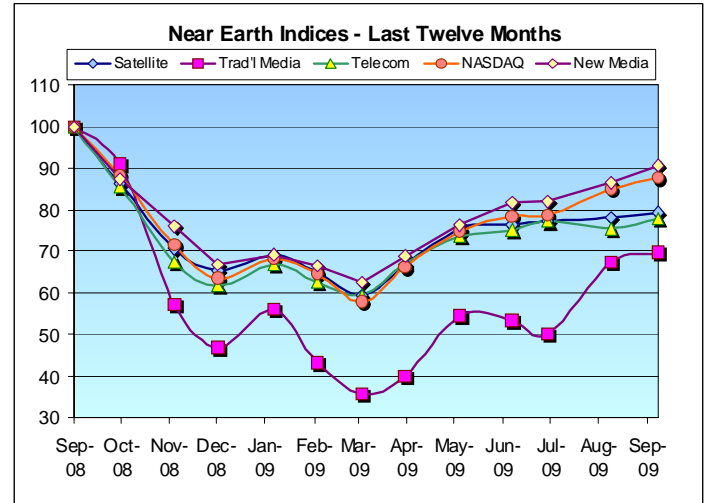


FROM THE GROUND UP

September 2009
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THE WAY WE SEE IT...
Satellite:

Greenhill Acquisition Corporation won FCC approval for its acquisition of **Iridium**, setting the stage for a shareholder approval vote. Given current trading in the stock and warrants, it looks likely the transaction will be approved, much to our surprise. **Greenhill Acquisition** also filed for a secondary stock offering to be completed subsequent to the merger, with proceeds to help fund replacement satellites for Iridium's aging constellation. If **Iridium** is really able to fund and field a new constellation, competitor **Inmarsat** is likely to find itself with a worthy and global foe for the first time. **SpaceX** won several new launch contracts, including for **ORBCOMM's** new fleet, extending its billion dollar plus pipeline (see article in this newsletter). The Augustine commission issued its report to NASA and the Administration, mostly seeking to reconcile goals to budget, but also putting in a strong recommendation for further reliance on commercialization of space. If adopted, this could represent a seminal point in the emergence of the commercial space industry (see article in this issue).

Telecom:

The first round of applications for broadband stimulus funds went in, 2,200 in all (actually fewer than expected) seeking a total of \$28 billion in funding (out of \$7.2 billion available). Two interesting points of note were (1) the decisions of most major telecom companies to abstain from submitting applications given net neutrality and other issues and (2) the new **EchoBlueRural** joint venture between **WildBlue Communications**, a **Liberty Media Corp.** (John Malone) investment and **EchoStar Corp.**, a Charlie Ergen led company. These strange bedfellows are seeking \$530 million of stimulus loans and grants. **Comcast** became the first MSO to offer 4G wireless broadband - in the Portland, OR market. The service is a rebranded version of **Clearwire's** Clear offering, with both local and national coverage (roaming on to **Sprint's** network). Given that **Comcast** has more that \$1 billion sunk into **Clearwire**, it's good to see them starting to realize a return on that investment. Following an abortive attempt by **Gilat**, WiMax equipment provider **Airspan** agreed to sell (for \$10 million) a controlling interest to **Oak Investments**, a major shareholder. With a substantial cash balance and numerous WiMax box builders feeling the need for cash, we wouldn't be surprised to see our friends at **Gilat** make another run at a WiMax firm.

Media:

Disney announced an acquisition of creative powerhouse **Marvel Entertainment**. Given the substantial multiple (23x 2010 earnings) and premium (28%) Disney is ponying up, we think this deal is proving once again that as distribution proliferates (i.e. cable, satellite, online, mobile video, fiber to the home, etc.) content is king. We expect to see multiples for premium content, and especially niche content, to appreciate going forward.

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Augustine commission recommends commercialization

... The report lays out several options for NASA's space exploration focus for the next couple of decades ...

The much anticipated Augustine commission report was delivered to NASA and made public this week. The report lays out several options for NASA's space exploration focus for the next couple of decades based on a hard nosed look at budgetary resources and technical feasibility applied against national space exploration goals. I encourage all members of the space industry community to read the entire report. In short, I think the commission did an intelligent job with an almost impossible task, and came up with ten important "Key Findings" as summarized and liberally reworded below with my commentary:

1. The right mission and the right size: Match budget dollars to missions and goals versus laying out bold vision statements unlikely to get sufficient funding. Basically, don't talk about sending humans to Mars unless you can pay for it. Also, give NASA ability to organize itself more efficiently for its new missions and funding levels. This last recommendation is great, but always runs up against the political difficulty of canceling or moving jobs from one Congressional district to another. Good luck. Will not hold breath.
2. International partnerships: Lead a bold new international effort rather than act alone or arrogantly. This is a welcomed change of national attitude and can have important foreign relation benefits and generate significant cost sharing opportunities. However, it may be hard to act as sole leader versus a co-leader if we have a 7-year human spaceflight gap. It will still be mainly our wallet at work, so worth a try.
3. Short-term Space Shuttle planning: Basically, delay Shuttle retirement by six months to allow for a realistic and safer conclusion of the current launch manifest. Makes sense although twelve months may prove more accurate.
4. The human-spaceflight gap: No credible approach to limit gap to less than six years and seven more likely. Only real option is to extend the life of the Shuttle which then creates a huge budgetary hole for exploration and systems development. In other words, we need to be nicer to the Russians.
5. Extending the International Space Station: It makes no financial sense in terms of a return on investment to spend 25 years building a facility we only use for 5 years, so we should fund an extension of ISS through 2020. The ignore sunk cost argument would make sense here except for the valid point that the asset also has important contributions to developing international spaceflight partnerships.
6. Heavy-lift: We need a new heavy lift capability to adequately conduct desired future missions and it will also be useful for national security launch requirements. There are pros and cons to basing the new heavy lift capability on each of the Ares rocket family, Shuttle derived vehicles and various EELV alternatives. The commission also seems

... It makes no financial sense in terms of a return on investment to spend 25 years building a facility we only use for 5 years ...

Augustine commission (cont.)

... Commercial services to deliver humans to ISS and low-Earth orbit are within reach and are likely to save lots of money ...

to be saying that to stay in budget, on schedule and to pay for a five year extension of ISS life we need to either move to (a) an Ares V Lite strategy or (b) use a Shuttle derived or EELV vehicle solution with in space refueling, and in both cases transfer ISS human transport to commercial providers.

7. Commercial crew launch to low-Earth orbit: Commercial services to deliver humans to ISS and low-Earth orbit are within reach and are likely to save lots of money. The commission recommends a new open U.S. competition with adequate incentives. I agree. NASA should focus on human exploration beyond low-Earth orbit.
8. Technology development for exploration and commercial space: It is important for NASA to increase R&D spending for the technology development necessary to enable more affordable and inspiring space exploration. This R&D spending will also benefit other U.S. government users and the U.S. commercial space industry. I can't imagine a better use of stimulus funds. It will help America stay at the forefront of an important 21st century industry, create many high skilled jobs and inspire a generation.
9. Pathway to Mars: The commission acknowledges human exploration of Mars as NASA's ultimate goal, but suggests it is not a realistic first step given budgetary constraints and technical challenges. I know this will be heart breaking for many Mars enthusiasts, but unless our politicians have a mass epiphany and reallocate a hundred billion dollars or so, humans to Mars before 2030 just isn't likely with today's technology. Of course, they did give this amount to save AIG, but perhaps safeguarding our financial system was a higher priority.
10. Options for the Human Spaceflight Program: The commission did not really address the humans versus robots debate, but did say human exploration beyond low-Earth orbit was not feasible with the 2010 fiscal year budget. However, they did believe meaningful human exploration beyond low-Earth orbit was feasible if we grew NASA's budget to \$3 billion above 2010 baseline by 2014 and then grew at 2.4% per year for inflation versus the current 1.4% budgeted annual increase. So, for roughly the cost of a "cash for clunkers" program (that mostly just increased Japanese car sales) we could have a meaningful human space exploration program. Sounds like a good national investment to me. The real option left unanswered by the commission is whether to (a) go first to the Moon to either develop a small colony or thoroughly explore the Moon's surface at diverse sites or (b) adopt a more "Flexible Path" visiting many new sites such as asteroids and other near Earth objects, Lagrange points (i.e. orbital points of special gravitational properties), and moons of Mars, plus additional robotic exploration of the Martian surface. The two paths are not mutually exclusive, but it is clear that we do not have budget to do both. **This will not be an easy decision and based on the discussion below, perhaps one that does not need to be**

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Augustine commission (cont.)

made if NASA is allowed to expand its support of space commercialization.

... while NASA may not be asked to hunker down for a cold winter, it is also far from likely to enjoy a balmy summer at the beach ...

I think the Augustine commission is correct that there is not sufficient national will given competing fiscal needs to do more than what the report lays out. Ultimately, the decision lies with the Obama Administration and Congress, but with between 9.7% and 16.8% of Americans unemployed, depending on your definition, substantially increasing funding for space exploration seems less likely to garner a political consensus when times are tough. On the one hand, there are many jobs at stake and in key states; high paying, high technology jobs in one of the few industries in which we still lead the world, the kind of jobs we are supposed to be protecting and growing.

Most likely, while NASA may not be asked to hunker down for a cold winter, it is also far from likely to enjoy a balmy summer at the beach. The best that can be hoped for is a Springtime of green shoots with lots of hands to help with the planting and the weeding, but not a whole lot of fertilizer to spread around. In short, the answer will most likely involve some significant requirement to do more with less. In other words, do things differently. Do things smarter. Get more bang for the tax payers' bucks.

... do things differently. Do things smarter. Get more bang for the tax payers dollars. ...

Here is how we look at the “different and smarter” problem at Near Earth. The Augustine commission options, and others, can all be broken down along three major axes creating in each case clear dichotomies of policy choices. The first axis is manned versus unmanned / robotic. That debate has been raging since before John Glenn and the Mercury program with manned being obviously more expensive and technically challenging, but of course far more rewarding both scientifically and emotionally. On the other hand, there has been an amazing amount of progress with robotics and telepresence in the last 20 years in some cases replacing the need for humans and in other cases clearly surpassing human capabilities (e.g. multispectral sensing and ability to tolerate extreme environments).

The second axis is near versus far with near meaning Earth orbit focused and perhaps the Moon and Lagrange points and far generally meaning Mars, one of its moons or the asteroids or other planets or their moons. We have sent several probes and landers to explore solar system bodies further than the Moon, but never a human. Many believe it is time to send out our best assets and really expand the envelope of human experience and achievement. Others believe phenomena like global warming demand we stick closer to home and better understand our own planet first. As the Augustine commission recommended, we should forget humans on Mars anytime soon, but their Flexible Path does include many destinations of interest that are far from Earth.

Augustine commission (cont.)

... The good news is that there is plenty of private capital looking to be deployed if we can just get the private / public model right. ...

The third axis is whether the mission involves a deep gravity well or a shallow gravity well with a massive body like Mars and to a lesser extent the Moon representing deep gravity wells (i.e. harder to land on and take off from). Other destinations like low Earth orbit, Lagrange points and the smaller moons of Mars represent shallower gravity wells. Deep gravity wells are more expensive and technically challenging, especially for return missions for either humans or samples. Note, all missions involve getting out of the Earth's deep gravity well, so we are ignoring that aspect.

Having laid out the three dichotomies, what does that suggest for smart policy choices? Well clearly, to both return humans to the Moon in force and go down the Flexible Path in style will require more money than NASA is likely to be appropriated. That means a major key to solving the problem of doing both is attracting large amounts of private capital. Private capital is notoriously risk adverse and so it will have to be enticed and allowed a chance to earn an appropriate risk adjusted reward for its investments. The good news is that there is plenty of private capital looking to be deployed if we can just get the private / public model right.

An example of NASA and the government getting the private / public model right is COTS (for an excellent article on COTS see: "COTS-like": the future of space procurement by Max Vozoff at thespacereview.com), so naturally one logical first step would be to create a similar program for other avenues of commercializing NASA's space exploration agenda. A Lunar COTS program is already being discussed within the space community, but there could be others as well like a Flexible COTS. Another good idea is for NASA to sponsor large prize awards for commercial achievements of particular missions of technology developments. Large meaning potentially hundreds of millions of dollars. Zero-G, zero-tax is also a very good idea.

... Zero-G, zero-tax is also a very good idea ...

But, what should be commercialized and what should be left to NASA? This is where the three dichotomies come into play. As an example of a commercialization decision methodology, take each NASA mission or requirement and assign a number between zero and one for each of the three dichotomies depending on where it falls on the axis in terms of relative difficulty and expense. For instance, a manned mission to Mars would score very close to "one" on each of the three dichotomies. It would be manned versus robotic, relate to a distant target versus a near one and involve a deep gravity well. This is why the commission thinks we are not ready to go. At the other extreme, cargo transport to the International Space Station would score very close to "zero" on each of the three dichotomies. It would be unmanned, close to Earth and not involve a deep gravity well. That is perhaps why NASA chose this mission as its first to commercialize through COTS.

Augustine commission (cont.)

... If commercial providers can be trusted to get humans safely to low-Earth orbit they can perhaps also be trusted to deliver robotic landers to the Moon or even a moon of Mars like Phobos ...

To make the measurement of mission “boldness” easier to remember lets give this scale a name. I like our new NASA Administrator, Charles Bolden, so let’s call it the Bolden Scale with particular scores on the scale referred to as the Bolden level for the mission. Clearly, missions with a ride level of 2 - 3 should be almost entirely NASA funded and executed whereas easier missions with a Bolden level of 0 – 1 could be, and probably should be, almost entirely handed over to the commercial world. New commercialized missions would thus also need respective COTS types programs or equivalently meaningful NASA sponsorship and support in the early years to literally get the commercial enterprises off the ground. Eventually, however, the expectation would be that all sponsored enterprises would need to achieve self sufficiency in a reasonable period of time and thereafter live off of affordably priced NASA contracts and hopefully new commercial revenue streams. This commercialization strategy seems in accord with the Augustine commission which recommends transferring human spaceflight to ISS to commercial suppliers in a new heavily incented competition. If commercial providers can be trusted to get humans safely to low-Earth orbit they can perhaps also be trusted to deliver robotic landers to the Moon or even a moon of Mars like Phobos.

Here is a table of potential space exploration missions and some relative, but arbitrary Bolden levels for illustration:

<i>Missions</i>	<i>Manned v. Robotic</i>	<i>Far v. Near</i>	<i>Deep v. Shallow Gravity Well</i>	<i>Bolden Level</i>
Manned Mars	1.0	1.0	1.0	3.0
Manned Phobos	1.0	1.0	0.2	2.2
Manned Lunar Landing	0.9	0.4	0.5	1.8
Robotic Phobos w/Return	0.0	1.0	0.2	1.2
Robotic Lunar Landers w/Return	0.0	0.4	0.6	1.0
Human Transport to ISS	0.8	0.0	0.0	0.8
Robotic Phobos, no Return	0.0	0.6	0.1	0.7
Robotic Lunar Landers, no Return	0.0	0.2	0.4	0.6
Unmanned Lagrange Mission	0.0	0.3	0.0	0.3
Cargo Transport to ISS	0.0	0.0	0.0	0.0

... NASA needs a force multiplier if it is going to once again match the accomplishments of the Apollo era and leaning on the commercial sector is the best force multiplier we can imagine ...

While one may argue the relative placement of the possible missions along this Bolden scale, it still remains likely that there are many missions that can now be executed partially if not wholly by the commercial sector, thereby freeing up NASA to focus on the more challenging missions and technology development efforts. The higher cost efficiencies of the commercial sector should translate into enormous budgetary savings to NASA over the long run. NASA needs a force multiplier if it is going to once again match the accomplishments of the Apollo era and leaning on the commercial sector is the best force multiplier we can imagine. As the Augustine report states, “...there is now a commercial space industry. If we craft the space architecture to provide opportunities to this industry,

Augustine commission (cont.)

there is the potential – not without risk – that the costs to the government would be reduced.”

... It also gets away from government being the whole solution or the whole problem and moves us to government being part of the solution while enabling, supporting and inspiring a powerful free market system ...

This strategy also seems to fit in with many of the Obama Administrations goals. It will save, but rationally refocus many existing NASA jobs while creating even more new jobs in the commercial sector funded largely by private capital. It will inspire many of the students the President spoke to this week about achieving wonderful things and contributing to their country. It also gets away from government being the whole solution or the whole problem and moves us to government being part of the solution while enabling, supporting and inspiring a powerful free market system. It also begins to move us away from a reliance on “old space” and its expensive and bureaucratic procurement system without pushing us too quickly to rely on a “new space” industry that is still developing and mostly unproven. It is in short a “smart space” strategy that uses traditional NASA and aerospace practices to make progress on the most challenging space endeavors while building up a capable entrepreneurial space industry to take us to a more affordable future in space.

By Hoyt Davidson
Near Earth LLC

The rise of the machines

While I must admit that I borrowed the title of this article from the *Terminator* franchise folks, I assure the reader this is no horror story. On the contrary, for both investors and those of us living in an increasingly connected world, this promises to be a story with a happy, and dare I say *profitable* ending.

What I am talking about is the admittedly delayed emergences of wide scale M2M (Machine to Machine) networks all around us. While forward thinking industry pundits have forecast this for some time, we seem to be approaching a tipping point driven by innovation along three fronts: cost effective technology, emergence of applications and finally allocation of capital. Let's consider each in turn.

Beginning with technology, here at Near Earth we can't help but notice that the development of this industry is mimicking the onset of the Space Age, which developed simultaneously, and some would say symbiotically with the Computer Age. Some of these important technology drivers behind M2M are:

- **Cheap WiFi transceivers** – Thanks to learning curve effects, a robust equipment ecosystem and a deep well of relevant engineering expertise, prices have fallen sharply. With collective production runs now nearing one billion units *per year*, and pricing in the single digits, when it is combined with cost effective broadband backhaul, WiFi greatly extends the reach of the machines.
- **Emergence of Personal Area Networks (PANs)** – Using the newer 802.15 standard extends much of the functionality of WiFi to applications where low cost and long battery life are critical – extending the network of the machines to a multitude of “lower priority” locations where extending a power line or requiring frequent battery changes is impractical. With a similar adoption curve to WiFi, ABI Research projects PAN device sales will grow from \$15 million in 2008 to approximately \$500 million in 2014 – an impressive 79.6% CAGR – and a lot more machines to talk to.
- **Buildout of wireless broadband data networks** – At the other end of the performance spectrum are the cellular networks, which provide near ubiquitous mobile coverage (especially when enhanced by a satellite component!), thanks to their multibillion dollar networks. At the cost of somewhat high power consumption and more costly terminals, and thanks to new 3G and emerging 4G standards, these networks also provide substantial capacity.

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The rise of the machines (cont.)

... It's not enough to just know where something is – it's also critical to know where other things are too ...

- **Rapid reductions in GPS software and chipset pricing** – Following a trajectory similar to WiFi, GPS technology has become widely available at low cost, and thanks to improved sensitivity and more powerful satellites, faster position solutions are available in more locations than ever before. Combined with MEMS technology, GPS receivers can continue to keep track of their locations even where there is no GPS coverage. More and better position information means more for the machines to talk about, and to act on.
- **Widespread availability of geospatial data sets** – It's not enough to just know where something is – it's also critical to know where other things are too. These data sets provide a critical step in transforming information into knowledge.

With these building blocks in place, bright people have started to fashion networks that address a wealth of applications. While we think the range of applications is close to unlimited, some of the most promising areas in M2M today are the following:

- Mobile asset monitoring and tracking (construction equipment, trucking, locomotives, rail cars)
- Smart energy grids (automated metering, load management, routing)
- Remote monitoring and control (SCADA pipelines, automated meter reading, wind farms, wireless towers)
- Security and safety (OnStar, maritime shipping Automatic Identification System, building security, border security)

... it's no great secret that M2M and M&A go together like bread and butter ...

With a growing array of applications, and dollars chasing them, the financiers have begun to respond, both in a bottom up and top down fashion.

- **Consolidation of service providers to meaningful scales** – Starting with the bottom up case, it's no great secret that M2M and M&A go together like bread and butter (In fact, here at Near Earth, you might say they *are* our bread and butter!). While some of this is simply the normal consolidation of an emerging industry, in the case of M2M the extensive sales cycles and significant risks that unsuccessful M2M deployments pose to their customers demand a greater degree of scale – and the market has responded. In fact, M2M magazine's M&A tracker recently topped over 100 transactions since 2004. Industry leaders such as GE, Numerex, Wireless Matrix, Siemens, Wavecom and Digi, among others have proven to be serial acquirers, and we expect this trend to accelerate as the financial thaw continues and markets become more accommodating.

The rise of the machines (cont.)

- **Gaining mindshare with large carriers** – As noted above, in many cases M2M networks employ the infrastructure of the major cellular carriers. Through both open network initiatives (with some prodding from our friends at the FCC, and Google for that matter), and more recently explicit alliances and JVs that directly address M2M the big boys are starting to pay attention to M2M. Consider the following tie-ups:

... the industry needs new ways to rejuvenate itself – and what better way than to have subscribers that aren't people? ...

- AT&T/ Jasper Wireless
- Verizon Wireless/Qualcomm
- Sprint/Datasmart
- T-Mobile/Sierra Wireless

Why all this attention? Because the big carriers are starting to become victims of their own success. As wireless penetration has grown to where it approaches 100% (currently over 90%) and ARPU has stagnated near \$50, the industry has employed innovative billing (i.e. prepaid) models and service models (\$99 all-in-one plans) to maximize their revenues, but these can only go so far.

Clearly, the industry needs new ways to rejuvenate itself – and what better way than to have subscribers that aren't people? When you have Verizon Wireless' Ivan Seidenberg declaring, at the CTIA keynote address that "...500% penetration is achievable.", it's clear where he thinks the world is headed. Here at Near Earth, we think that not only is he right, but when other forms of connectivity such as PANs, WiFi and others are considered, the total addressable market for M2M is more like the 60 billion devices that Jasper Wireless says could benefit from M2M deployments. As these firms begin to really penetrate that opportunity, it will truly mark the beginning of the age of the machines.

By John Stone
Near Earth LLC

SpaceX hits the big time

... this startup and its founder had the temerity and the ingenuity... to develop and operate a disruptively different commercial launch service using largely private capital and ... profitably...

A launch here, a service contract there, sooner or later we're talking about real money. With each passing week, the relentless drip, drip, drip of announcements – an Orbcomm launch contract one day, an Astrium contract the next – from Space Exploration Technologies (SpaceX) amasses into a gushing torrent. Add a dollop of successful launches, tens of millions of outside private capital, a ruthless commitment to cutting costs and a billion-dollar backlog of orders built on offering the lowest prices in the industry – that's not just a company, that's a business.

If it seems we speak with undue highness of SpaceX and its founder, Elon Musk, it is because it bears repeating exactly what it has done to merit such praise. More than just creating grand plans and fancy presentations, this startup and its founder had the temerity and the ingenuity to do what no one had ever successfully done before – to develop and operate a disruptively different commercial launch service using largely private capital and, from all reports, to do so profitably. To do so while developing a new space cargo delivery system and winning an International Space Station cargo supply contract without historical precedent and amidst a long trail of failed competitors, is quite the accomplishment.

If that past success is not enough, Elon and SpaceX should be pleased by the result of the recently released Augustine commission report. As discussed earlier in this issue, the commission not only recommends, in almost every scenario, continued support for commercial transport solutions (both cargo and crew) to low-Earth orbit, but also continued support for the International Space Station until 2020. SpaceX's backlog of cargo missions, via its Dragon capsule and its Falcon 9 craft, is already stretched out to the current Station due date – itself a commitment of \$1.6 billion until 2015. If the new directions by the Augustine commission become NASA policy, SpaceX's potential backlog could treble.

... A launcher with the Falcon 9's already long manifest and backlog, built upon a diversified customer base, has before it a direct path to gaining the flight heritage ...

Let us also not ignore that the capabilities of the Falcon 9 place SpaceX smack dab in the commercial satellite market, where a gaping hole in the market has now been left by the bankruptcy of Sea Launch. Although Chinese and Indian launch service providers have recently been nipping away at the launch market, for all practical purposes, operators are now left with a duopoly of Arianespace and International Launch Services. Although the launchers these firms market are prized for capability and reliability, limited capacity has strained some business plans. The large operators simply cannot depend on getting the satellites they order in orbit when they need it. A launcher with the Falcon 9's already long manifest and backlog, built upon a diversified customer base, has before it a direct path to gaining the flight heritage, reliability and sustainability the major commercial satellite firms demand.

SpaceX hits the big time (cont.)

The other option would be to hit the big time and go to the public markets with an IPO ...

Of course, we beg the question, what next for SpaceX? The company will most likely need further capital to develop its crew transport capability even though a COTS expansion will fund much of these costs. SpaceX could continue to access institutional private capital, as it has successfully done on multiple occasions. The other option would be to hit the big time and go to the public markets with an IPO. Although the after-effects of the financial crisis and the weak global economy have dampened the prospects for many IPOs, we believe that a company with such a solid competitive position, a strong customer base and growth potential would nonetheless do well in this environment. Moreover, a commitment to develop a new and unique commercial crew transport capability against a backdrop of eager government demand would be, in our opinion, an excellent use of proceeds. Given Elon's PayPal experience this would have to be done in a way that did not involve a loss of control, but as we saw with the Google IPO and the use of super voting Class B shares, the public market will, in special and promising cases, allow founders with successful track records to keep control of their companies.

The past year has already seen the arrival of satellite imaging operator DigitalGlobe to the public markets and soon, as it now seems quite likely, to be followed by mobile satellite operator Iridium. The entry of SpaceX would not only expand on the growing roster of publicly traded space and satellite companies, but would add a new dimension where only few, such as Orbital Sciences Corp, have gone before. Not a telecom company or a remote sensing company and not merely an aerospace company, SpaceX is a breed that has barely before been available to retail investors – a space transportation company.

Bring someone or something where they want to go, when they want to go, at a price they're willing to pay and all of a sudden, you are a transportation operator...

Bring someone or something where they want to go, when they want to go, at a price they're willing to pay and all of a sudden, you are a transportation operator. Maybe not, 'build it, and they will come', but perhaps 'build it, and they will go'. The launch service business has established beyond any possible doubt that, with low enough prices, commercial transportation services are not in the least confined to the Earth's surface. And if low Earth and Geostationary orbits are not in doubt, can anyone really say there cannot be a successful commercial transportation service anywhere else? Near Earth asteroids? The surface of the Moon? Mars? Why not?

In the mid-nineteenth century, there was nothing more exciting to the public markets than the promise of railroads, the new method of disruptively cheap, mass transportation. Across the U.S. and Europe, thousands of miles of railroad track were laid while whole new territories and markets were opened to trade and economic exploitation. Hundreds of railroad joint stock companies were founded, of which many raised vast sums of capital to build their railroads. Investors and speculators, from the largest investment houses to the middle-class man on the street, sucked

SpaceX hits the big time (cont.)

up the stock and high yield bonds, wanting a piece of the action and a right to a stake in the future.

Investors and speculators, sucked up stocks and high yield bonds, wanting a piece of the action...

Although history records that Railroad Mania ended with a pop of a bubble and a market crash, the end result was the laying of the infrastructure that the following century of the as-of-then unparalleled economic expansion was built upon. A century and a half later, are we seeing with SpaceX and its erstwhile imitators and competitors, the beginnings of a new transportation infrastructure? If so, that's not just a new direction, that's talking real money.

By Ian Fichtenbaum
Near Earth LLC

... Uses of geospatial data continue to increase as data becomes more accurate and dependable and collection becomes more cost effective....

Traditionally, geospatial data identifies the geographic location, boundaries and characteristics of natural or constructed features of the earth. Geospatial information serves as information for defense such as targeting, traversing terrain, and mission planning. Civil applications use geographic information as the foundation for route planning and navigation, disaster simulation and response and such critical decisions as where to build a new plant and how to mitigate fire risks. Uses of geospatial data continue to increase as data becomes more accurate and dependable and collection becomes more cost effective. Daratech recently estimated (www.daratech.com/press/releases/2009/091908.html) the GIS/Geospatial market at just over \$5 billion. Software, data, and hardware make up the largest sectors of the market.

Use of geospatial data has historically been the domain by government agencies; now the data is a critical element in the corporate and consumer markets as well. Representative uses of geospatial data and applications include:

- Asset management (roads, bridges, utility infrastructure, etc.)
- Business decisions (business expansion, location analysis and marketing)
- Climate / weather reporting
- Disaster simulation and relief
- Education and school curriculum
- Environmental monitoring and reporting
- Flight simulation
- Land development and planning
- Location-based services (route planning, navigation, emergency response)
- National defense
- Natural resource planning (forestry, mining, energy, agriculture and marine)
- Public safety and security
- Transportation (intelligent transportation systems) - land, sea or air.
- Land planning

The development of Google Earth and Microsoft Virtual Earth ...has created the development of a new way to organize information ...

There are many other uses emerging as mapping is rapidly becoming the basis for a new form of social media. The development of Google Earth and Microsoft Virtual Earth and the associated geographic applications for the web has created the development of a new way to organize information and to discover knowledge using geographic location. This is rapidly changing the market and use of geographic information. Geographically organized local information is creating new sources of personal information for navigation, energy use, real estate, and a host of

Guest article: It's all about location (cont.)

other applications. Software applications are emerging that enable the accelerated growth by a new class of users who are not experts in geographic information and do not have a discipline in the underlying technology to create the data.

New applications emerge daily such as the use of maps to display the funding expenditure information on Recovery.gov (www.recovery.gov), the web interface now in use by the City of San Francisco for energy information. One forecast estimates the five fastest growing applications are land planning, agriculture, public health, oceanography, intelligence gathering.

... To meet growing needs, both software and data are required in quantities not imagined a few years ago. ...

To meet growing needs, both software and data are required in quantities not imagined a few years ago. Remote sensing of the earth performed by aerial and satellite based sensors has been increasing at significant rates. Once exclusively owned and operated by the world's premier intelligence agencies, there are now optical satellites carrying high resolution sensors (able to distinguish an object of 1 meter or better). The number of these satellites will easily exceed 15 in the next few years. Radar equipped satellites that are able to image the Earth day and night and in all weather conditions will number up to a dozen within the same time period. Massive amounts of world-wide data from these sources will be available to anyone. According to the Paris-based firm, Euroconsult, global sales are expected to reach \$1 billion in 2009 and then quadruple by 2018. (www.euroconsult-ec.com/news/press-release-33-1.html)

While the non-government markets have not yet grown to a size to sustain the satellite companies, national priorities in a number of countries provides a funding source to sustain the capital investments required. Many are predicting that the satellite operators will have to move to a model of selling more than just imagery to sustain their operations.

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In addition to the satellites, there are hundreds of aerial platforms equipped with the latest technology that are also collecting laser, optical, and radar data of the Earth. Companies like Hexagon, Intergraph, Microsoft and Optech are all selling the latest in sensor technology and developing new technology to capture more and more data about the Earth. The market for aerial based data is also growing rapidly as the cost for this imagery source has decreased significantly over the last few years, due to advances in technology, and the quality has increased significantly. Imagery resolution of 3 inches is now available and being used by municipal governments. Laser based data (LiDAR) can perform elevation measurements of 12 centimeters that allow risk assessments from potential flooding to be more accurately quantified.

With this wealth of data, is also an explosion in software to use all the data. From massive computing systems to personal navigation devices to

Guest article: It's all about location (cont.)

the cell phone new applications are emerging daily. Companies like Layars (layar.com) are creating augmented reality browsers incorporating geospatial data on the latest phones for:

- Real estate
- Health care
- Transportation
- Tourism: Places to stay
- Tourism / Tours / Guides
- Leisure and entertainment
- Games
- Weather
- Retail
- University / Schools
- Local search & Directory service
- Social networks & communities

Eye candy rules and 3D data was on display... In the near future, a total geospatial solution will be represented and visualized in 3D ...

Just as explosive is the growth in 3D and visualization. The SPAR conference, held in Denver this year, was alive with customers, hardware vendors, survey professionals, geotechnology experts, and many others. As in most spatial data market events, one thing was clear. Eye candy rules and 3D data was on display in almost every booth. New software and hardware vendors were out in force. In the near future, a total geospatial solution will be represented and visualized in 3D. Google and Microsoft have brought 3D raster data sets to the masses. However, visualization for the sake of visualization is not a market. Eye candy is fun to look at, but is not a sustainable sell.

... integration of technologies is yielding impressive results for customers seeking to change their workflow and deliver results more efficiently ...

What was clear at the conference is that integration of technologies is yielding impressive results for customers seeking to change their workflow and deliver results more efficiently. The integration of airborne LIDAR, along with ground and mobile LiDAR, with GPS/RTK and traditional survey creates products that have significant utility across many markets. Where software applications have been developed, there are instant uses such as building design, tax assessment, emergency response, event planning, targeting, offshore construction, oil and gas, transportation infrastructure, automotive and aviation.

Whether you call it actionable intelligence or just more information, data is just data and is of no enhanced value to a customer unless it conforms to standards and is usable. These standards that must exist to ensure customers know what they are buying and have a way to measure quality. The customer community requires applications and data that allows the change of workflows and improves the efficiency of decision making or they are not interested. In addition to the traditional standards and specifications City GML and Building Information Modeling (BIM)

Guest article: It's all about location (cont.)

standards are now emerging to form specification baselines to eliminate the confusion of deliverable products that now exists in the 3D world.

With even more technology in development, we've only seen the beginnings of the use of geospatial information ...

All this data is creating huge demands for efficient processing, storage, and distribution as well as advanced information extraction techniques. On the data side, production methodologies have to be developed to efficiently build the required data sets at market prices that are attractive to the customer. The market will increase in size as the applications for use of data increases. There is opportunity for the software providers in the production applications and the end user applications. On the user side, new applications are clearly emerging to take advantage of these rich data sets. Everything from large server applications to iPhone applications are being announced daily. The GIS and CAD communities are changing as the market is changing. GIS software now includes image processing capability while CAD now incorporates new sources of 3D information. The evolution of the market has the potential to blur the distinction of these two technologies going forward. With even more technology in development, we've only seen the beginnings of the use of geospatial information.

By John Copple
The Sanborn Map Company, Inc.

Sanborn is the oldest mapping company in the United States and one of the largest mapping and geospatial companies. Mr. Copple has extensive background in the international market and applications for geospatial information. Prior to joining Sanborn, Mr. Copple was Chairman and Chief Executive Officer of Space Imaging, Inc. the first operational satellite imaging company.

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In the early days of the industry, there was an informal 'gentlemen's' agreement where administrations responsible for IGOs made satellite filings purely to meet the needs of those organizations ...

... we find the geostationary orbit very much congested and difficult to access the finite amount of frequencies associated with satellite services...

The possible reform of the ITU, or the regulatory process with which it manages satellite services, is a topic that is always on the minds of many in the satellite industry. This is because it is only through the International Telecommunications Union (ITU) in Geneva that our national regulators, and then the satellite industry, gain access to the lifeblood of our business, radio frequencies. Any changes to this process affect all in the industry, from satellite operators to investors, and this is why it is such an important topic.

Obtaining access to those most vital frequencies is seen as high art by some and as voodoo by others. Yet, if you take the time to understand what is actually going on, it can be a deeply fascinating and ultimately transparent process. There is a lot of relevant history out there surrounding satellite filings and if you'll allow me to delve into recent events, we will try to expound upon them, see their impact on the potential future, and shed light on what is going on today.

Before commercial satellite operators were instrumental in creating today's industry, the market was served by inter-governmental organizations (IGOs) such as Intelsat, Eutelsat, Intersputnik, and Inmarsat, some of which are today private companies. In the early days of the industry, there was an informal 'gentlemen's' agreement where those administrations responsible for IGOs made satellite filings purely to meet the needs of those organizations. Once access to orbital positions/frequencies was fully commercialized, many sought different approaches to seek greater commercial opportunities. This led to the situation that we have today – where we find the geostationary orbit very much congested and difficult to access the finite amount of frequencies associated with satellite services.

The ITU and national administrations have worked proactively to tackle the congestion in the arc and filing process. This is why today we have due diligence processes for satellite filings at national administrations and at the ITU to try to sort the wheat from the chaff. The additional workload created at the ITU resulted in charges being levied on those making satellite filings. It is very much a case of cause and effect.

Filing is also a competitive process, as of course all commercial operators in many different countries compete to gain the best orbital positions and frequencies to meet their business needs. Yet at the same time, these commercial operators, and those in associated businesses often band together to work well as an industry, for example, when facing encroachments upon our limited frequencies.

Radio frequencies are a valuable and finite natural resource and the demands upon their use are increasing almost daily with every new digital

Guest article: Thoughts on satellite filings (cont.)

... satellite operators do spend disproportionate amount of time, in comparison to their terrestrial counterparts, in gaining access to markets ...

technology that rolls out. There is only so much spectrum. We can't make any more. We often see the terrestrial sector that we serve as an industry competing with the satellite sector for access to spectrum. For example, in recent years the satellite industry, working together as a collective, fought off encroachment of mobile services into the C-band. This showed us that we have to defend what spectrum we have while working to gain access to new bands to allow the growth of our own businesses. We cannot take spectrum for granted.

When looking at spectrum concerns there are a whole host of issues and contributing factors, both space-based and terrestrial-based, and it's not just the focus of the ITU, but the whole scope of the sector that we have to consider. We can't hope to cover them all here, but we will try to touch base on some relevant examples. Nothing is ever perfect, but the system does work.

Another important factor is market access or opening your skies to allow satellite operators to land signals to create new services and competitive prices for the market in that country. Although there has been so much progress with guidelines agreed at the World Trade Organization, satellite operators do spend disproportionate amount of time, in comparison to their terrestrial counterparts, in gaining access to markets. There is the potential to do more to ensure equitable access to markets to satellite operators.

Another area of recent activity is in the realm of 'phantom' satellites, orbital filings where a nation has Brought Into Use (BIU) an orbital filing, yet where no satellite actually exists. The recent ITU Circular Letter # '301' addresses this and is asking for every national administration in the world to re-examine their satellite fleets and orbital filings to ensure that they tally with reality. Another hopeful freeing up of a vital resource we can all benefit from.

As the ITU and our national administrations work to adapt the filing process to meet and serve the ever evolving spectrum environment, we find ourselves facing we have to work with them on this...

For example, we can see this in another recent development, where the European Union has taken steps to assign frequencies/orbital positions for EU-wide satellite applications, for them a next logical step onwards from their terrestrial work. However, what might work well for terrestrial cell phones or for broadcasting on the ground, but it doesn't always work well in space and is inconsistent with the ITU process established under an international treaty. We can never take our eyes off the ball, not even for one moment.

It can be said that 'change is the only constant' in satellite filing. As the ITU and our national administrations work to adapt the filing process to meet and serve the ever evolving spectrum environment, we find ourselves facing we have to work with them on this.

Guest article: Thoughts on satellite filings (cont.)

Professionals competing for a resource, yet cooperating to make it happen: it gives true meaning to the word integrity ...

At the end of the day, ours is also a small industry and this is especially so in the arcane realm of orbital filings. I've been fortunate to have spent time working in politics in both Washington DC and in Westminster and I can honestly tell you that the negotiating and diplomacy I witnessed there are nothing when compared to the skills I've seen displayed by the regulatory teams around the table at a frequency coordination meeting. If you ever have the chance to attend such a meeting, I would highly recommend it. It is at the same time both enlightening and heartening to see the experts, regulator and commercial counterpart alike, at work. Professionals competing for a resource, yet cooperating to make it happen: it gives true meaning to the word integrity.

The satellite industry is somewhat unique in that we work more closely with the ITU than almost any other industry in the world. Our use of radio spectrum crosses continents and connects them and is truly international in nature. It's unique in that the ITU maintains the Master Frequency Register for our orbital filings. It gives our industry a unique perspective that can be most valuable.

Spectrum is also increasingly scarce in orbit. Nations compete for it. We compete for it. It drives our industry. Yet, it is a part of our industry that is known and understood by relatively few. We tend to focus on the satellites and launch vehicles and on the revenue, which is all good and well. Yet you'll see that those companies who also focus on the frequencies are usually those who are leading the market.

Spectrum is also increasingly scarce in orbit. Nations compete for it. We compete for it. It drives our industry ...

These companies also tend to be the leading voices via the industry's various associations, who are the focal points for the coming together of the industry to discuss and to act upon its frequency concerns: the European Satellite Operators Association (ESOA); the Cable & Satellite Broadcasting Association of Asia's (CASBAA) Satellite Forum; and the US based Satellite Industry Association. One of the better ways to understand the issues around orbital filing and radio frequencies is to get involved with and to support these and other industry associations. We can't expect the ITU to solve the issues for us; instead we have to work with them to solve them together for us all and we can achieve this by becoming more engaged in the radio frequency process via our industry associations.

Yet, do we really want a perfect regulatory world? An awful question to ask, I suppose? How nations approach the ITU filing process does differ. These nuances do make a difference. Satellite filings are the keystones for any satellite venture. Satellite filings are obtained by working with the ITU via a national government. Jurisdictions around the world compete for this business. ManSat works on behalf of the Isle of Man in this regard. ManSat believes that although the system is not perfect, it works reasonably well, and it allows for competition which ultimately benefits the market.

Guest article: Thoughts on satellite filings (cont.)

In closing, it's always easy to criticize any organization or any process, but at the end of the day we must remember that those working at the ITU and as our national regulators are doing a great job under increasingly difficult circumstances. These are people who work hard with very limited resources to make our work possible. Given the importance of radio frequencies, it would come as a shock to many at how little resources our national and international regulators have to work with. There are so many competing demands, yet the regulators have to balance all of them. It is increasingly a very difficult, yet ever more important role that they play.

Given the importance of radio frequencies, it would come as a shock to many at how little resources our national and international regulators have to work with...

The closer you work with your respective regulators the better you are able to ensure that they understand your needs. They can't represent you if they don't know what you need representing. The Satellite Filing process is a superb example of such a relationship where those who successfully work in transparent partnership with their regulators progress at all levels, and it must always continue to be a partnership as opposed to an adversarial relationship.

Every question our industry faces in the future as it continues to grow hinges around the use and growing scarcity of spectrum, which in turn depends greatly upon the smooth and rational functioning of the regulatory processes with which we continue to work. How will we integrate Space Based Solar Power into the geostationary arc? How will we land their power signals into an already congested terrestrial frequency environment? How will we commercialize the Moon and the space between it and the geostationary arc? Yet these are just two of many new ideas being pursued by venture companies today that could be the new 'Googles' of tomorrow.

One final thought is that your regulators and frequency experts have been doing too good a job. No, really. They have been working so well that the rest of the world, let alone the rest of the industry, often forgets that they are there and their work goes unnoticed. They make the impossible look easy. It's always about the frequencies...

By Chris Stott
ManSat Limited

Chris Stott is Chairman and CEO of ManSat and is also the Isle of Man's Honorary Representative to the Space Industry. He sits on the Board of the SSPI, ISU where he is also faculty, and the Institute of Space Commerce, as well as serving as a Board Member of Odyssey Moon Limited. He is also the Chairman of the Manna Energy Foundation, a not for profit working in water and energy programs in Central Africa. His wife, Nicole, is currently serving aboard the International Space Station as part of Expedition 20.

Building upon the Isle of Man's preeminent position as a supplier of world-class banking and financial services, ManSat provides tailored business services to meet the needs of the international space industry, specifically focused on providing access to geostationary orbits and associated radio frequencies. www.mansat.com

NEAR EARTH ANALYSIS: MARKET COMPARABLES

Public Market Valuation Analysis of Selected Companies in the NEAR EARTH MEDIA INDEX

(\$ in millions, except per share data)		Stock Price:		Enterprise Value as a Multiple of:			Price as a Multiple of:			
	9/9/09	Market Value of Equity	Enterprise Value (a)	LTM Sales	LTM EBITDA	LTM EBIT	LTM EPS	Trailing EPS (b)	Forward EPS (b)	
Satellite Broadcast (DBS and DARS)										
BSY.L	British Sky Broadcasting (f)	£ 5.29	\$15,342.79	\$18,891.69	2.2x	10.2x	13.6x	32.6x	28.1x	23.4x
DISH	Dish Network Corp	\$ 16.95	\$7,573.26	\$11,379.00	1.0x	3.9x	5.8x	7.4x	8.8x	8.0x
DTV	DirecTV Group Inc.	\$ 25.02	\$24,908.66	\$28,748.66	1.4x	5.7x	12.2x	19.2x	17.9x	11.7x
SIRI	Sirius XM Radio	\$ 0.69	\$2,679.90	\$5,698.53	2.5x	18.3x	n/m	n/m	n/m	n/m
	Mean				1.8x	9.5x	10.5x	19.8x	18.3x	14.4x
Cable Television										
CMCSA	Comcast Corporation	\$ 16.85	\$48,538.78	\$77,772.78	2.2x	5.6x	10.4x	15.3x	15.2x	14.3x
MCCC	Mediacom Communications Corp.	\$ 5.55	\$374.40	\$3,692.91	2.6x	7.1x	12.4x	n/m	6.8x	9.6x
TWC	Time Warner Cable Inc.	\$ 39.26	\$13,835.22	\$36,198.22	2.1x	5.7x	10.9x	6.0x	13.1x	11.2x
CVC	Cablevision Systems Corp	\$ 24.02	\$7,234.58	\$18,585.69	2.4x	9.5x	22.1x	n/m	24.3x	16.6x
	Mean				2.3x	7.0x	13.9x	10.7x	14.8x	12.9x
Television										
TVL	LIN TV Corp.	\$ 3.18	\$163.55	\$835.94	2.3x	6.9x	12.6x	n/m	n/m	11.4x
SBGI	Sinclair Broadcast Group	\$ 3.01	\$239.60	\$1,554.36	2.3x	5.7x	12.5x	18.3x	n/m	9.7x
FSCI	Fisher Communications Inc	\$ 20.29	\$177.54	\$241.12	1.6x	8.5x	n/m	7.1x	n/m	n/m
	Mean				2.1x	7.0x	12.5x	12.7x	n/m	10.5x
Radio										
CMLS	Cumulus Media Inc.	\$ 1.37	\$57.16	\$688.87	2.5x	9.2x	11.0x	n/m	2.6x	n/a
ETM	Entercom Communications	\$ 4.54	\$171.88	\$970.61	2.4x	8.8x	10.5x	n/m	7.3x	4.0x
	Mean				2.5x	9.0x	10.7x	n/m	5.0x	4.0x
NewsPrint										
MNI	The McClatchy Company	\$ 1.92	\$160.61	\$2,122.53	1.3x	6.6x	13.2x	n/m	3.3x	6.9x
NYT	New York Times	\$ 7.37	\$1,061.21	\$2,036.68	0.8x	8.7x	22.0x	n/m	n/m	n/m
WPO	Washington Post	\$ 435.45	\$4,093.23	\$3,785.72	0.8x	6.4x	14.6x	39.7x	33.0x	na
	Mean				1.0x	7.2x	16.6x	n/m	18.1x	6.9x
New Media										
MSFT	Microsoft Corporation	\$ 24.78	\$220,740.24	\$195,038.24	3.3x	8.5x	9.4x	14.9x	14.8x	12.9x
AAPL	Apple Inc.	\$ 171.14	\$153,296.94	\$129,074.94	3.7x	17.0x	18.7x	29.9x	29.3x	25.1x
YHOO	Yahoo! Inc.	\$ 14.78	\$20,627.71	\$16,770.21	2.5x	11.8x	27.2x	n/m	n/m	37.0x
GOOG	Google Inc.	\$ 463.97	\$146,809.39	\$127,465.38	5.7x	16.5x	20.7x	33.7x	21.4x	18.8x
IACI	Interactive Corporation	\$ 19.49	\$2,941.43	\$1,202.48	0.9x	22.8x	n/m	10.8x	n/m	30.5x
ERTS	Electronic Arts Inc.	\$ 18.53	\$5,986.12	\$3,707.12	0.9x	n/m	n/m	n/m	18.9x	14.6x
	Mean				2.8x	15.3x	19.0x	22.3x	21.1x	23.1x
Satellite Imagery										
GEOY	GeoEye	\$ 24.95	\$464.07	\$664.17	3.4x	9.6x	16.7x	12.5x	19.6x	14.8x
DGI	DigitalGlobe Inc.	\$ 19.89	\$892.07	\$1,101.57	4.0x	6.5x	12.8x	18.1x	22.1x	23.1x
	Mean				3.7x	8.0x	14.7x	15.3x	20.9x	18.9x

MEDIA SERVICES INDEX

High	5.7x	22.8x	27.2x	39.7x	33.0x	37.0x
Mean	2.0x	8.4x	12.6x	14.8x	14.3x	13.8x
Low	0.8x	3.9x	5.8x	6.0x	2.6x	4.0x

(b) EPS estimates from Thompson First Call. Near Earth does not estimate EPS and does not condone or validate these estimates.

n/m Not Meaningful.

(c) Converted to US \$ from Euro at an exchange rate of 1.4565 US \$ per Euro.

na Not Available

(d) Converted to US \$ from C\$ at an exchange rate of 0.9271 US \$ per C\$.

(f) Converted to US \$ from British Pound at an exchange rate of 1.6545 US \$ per British Pound.

Member of NEAR EARTH SATELLITE INDEX

NEAR EARTH ANALYSIS: MARKET COMPARABLES

Public Market Valuation Analysis of Selected Companies in the NEAR EARTH TELECOM INDEX

		Stock Price:		Enterprise Value as a Multiple of:			Price as a Multiple of:			
		9/9/09	Market Value of Equity	Enterprise Value (a)	LTM Sales	LTM EBITDA	LTM EBIT	LTM EPS	Trailing EPS (b)	Forward EPS (b)
Satellite Capacity										
ETL.PA	Eutelsat Communications (c)	€	18.98	\$6,070.21	\$9,677.74	7.1x	8.7x	14.1x	16.8x	24.7x
SESG.PA	SES Global S.A. (c)	€	13.83	\$8,048.94	\$13,123.68	5.4x	8.0x	13.9x	14.2x	16.5x
ISAT.L	Inmarsat (f)	£	5.40	\$4,105.67	\$5,523.57	5.4x	9.9x	14.9x	11.0x	12.3x
				Mean	6.0x	8.8x	14.3x	14.0x	20.0x	17.8x
Satellite Ground Segment										
CMTL	Comtech Telecommunications	\$	34.63	\$859.17	\$731.62	1.2x	6.5x	6.4x	11.1x	20.3x
GCOM	Globecom Systems Inc.	\$	8.19	\$167.95	\$123.92	0.7x	12.5x	31.3x	n/m	23.4x
GILT	Gilat Satellite Networks	\$	4.67	\$187.22	\$87.18	0.4x	7.0x	n/m	n/m	n/a
HUGH	Hughes Communications, Inc.	\$	26.51	\$572.62	\$993.68	0.9x	7.4x	16.2x	n/m	14.8x
ISYS	Integral Systems Inc.	\$	6.38	\$110.37	\$114.64	0.7x	8.7x	12.3x	15.5x	21.3x
VSAT	ViaSat Inc.	\$	24.95	\$772.20	\$752.00	1.2x	10.2x	16.2x	19.2x	13.1x
				Mean	0.9x	8.7x	16.5x	15.3x	17.6x	18.0x
Satellite Space Segment										
ORB	Orbital Sciences	\$	14.57	\$822.04	\$599.53	0.5x	7.4x	9.7x	17.6x	24.3x
CDV.TO	COM DEV International (d)	\$	2.71	\$191.20	\$193.69	0.9x	6.2x	9.3x	10.7x	n/a
MDA.TO	McDonald Dettwiler and Associates (d)	\$	30.96	\$1,252.95	\$1,619.38	1.6x	10.3x	12.9x	18.5x	n/a
OHB.DE	OHB Technologies (c)	€	8.80	\$190.46	\$139.44	0.4x	4.3x	5.6x	18.1x	16.0x
				Mean	0.8x	7.1x	9.4x	16.2x	20.9x	15.6x
Towers										
AMT	American Tower	\$	34.27	\$13,564.07	\$17,678.96	10.7x	16.9x	27.8x	n/m	n/m
CCI	Crown Castle	\$	28.71	\$8,281.69	\$14,535.23	9.1x	16.2x	39.3x	n/m	n/m
SBAC	SBA Communications	\$	25.03	\$2,919.50	\$5,132.31	9.8x	17.3x	n/m	n/m	n/m
				Mean	9.9x	16.8x	33.5x	n/m	n/m	n/m
General Telecom										
S	Sprint Nextel Corporation	\$	3.68	\$10,568.96	\$26,967.96	0.8x	3.8x	n/m	n/m	n/m
T	AT&T	\$	25.94	\$153,046.00	\$222,821.00	1.8x	5.3x	10.0x	12.4x	11.7x
VZ	Verizon Communications, Inc.	\$	30.89	\$87,746.44	\$191,624.44	1.9x	5.5x	11.0x	14.8x	11.7x
				Mean	1.5x	4.9x	10.5x	13.6x	12.3x	11.7x
TELECOM SERVICES INDEX (excludes Towers stocks)										
		High	7.1x	12.5x	31.3x	19.2x	26.6x	24.7x		
		Mean	1.8x	6.8x	12.3x	12.0x	12.4x	16.5x		
		Low	0.4x	3.8x	5.6x	10.7x	12.2x	11.7x		

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(c) Converted to US \$ from Euro at an exchange rate of 1.4565 US \$ per Euro.

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n/m Not Meaningful.

n/a Not Available

Member of NEAR EARTH SATELLITE INDEX

NEAR EARTH ANALYSIS: M&A TRANSACTIONS

Selected Satellite, Telecom & Media Transactions

(US\$ in millions)

Date Announced	Acquiror	Target	Equity Value (a)	Transaction Value (b)	Transaction Value/		
					LTM Sales	LTM EBITDA	
Satellite Operators							
04/21/04	KKR	PanAmSat Corporation	\$3,532.0	\$4,300.0	5.2x	7.7x	
06/06/04	Blackstone Group	New Skies Satellites NV	956.0	956.0	4.5x	7.7x	
08/17/04	Zeus Holdings	Intelsat Ltd.	3,100.0	5,000.0	5.2x	7.6x	
08/29/05	Intelsat Ltd.	PanAmSat Holding Corporation	3,065.0	6,271.1	7.5x	9.7x	
12/14/05	SES Global	New Skies Satellites NV	760.0	1,160.0	5.0x	8.0x	
12/05/06	Abertis Telecom	EutelSat (32% share)	1,000.0	1,838.0	7.3x	9.7x	
12/18/06	Telesat (new)	Telesat (old)	2,800.0	2,940.0	7.1x	12.0x	
12/18/06	Telesat (new)	Loral Skynet	691.0	1,050.0	7.1x	19.6x	
12/18/06	Telesat (new)	Telesat/Skynet Combined	3,491.0	3,990.0	7.1x	13.4x	
06/19/07	BC Partners	Intelsat	5,000.0	16,400.0	7.7x	11.3x	
08/02/07	Abertis Telecom	Hispasat (28.4% share)	199.0	199.0	5.8x	7.9x	
				Mean	6.3x	10.4x	
Ground Equipment & Systems Integrators							
08/03/06	Thrane & Thrane	Nera's Mobile Satellite Communications	89.6	89.6	1.1x	n/d	
03/19/07	CIP Canada Investment Inc.	Stratos Global Corporation	293.3	621.5	1.2x	2.9x	
05/12/08	Comtech	Radyne	201.9	223.6	1.5x	16.0x	
07/10/08	Nokia	Naveq	7,719.0	8,100.0	8.8x	29.5x	
05/09/09	Rockwell Collins	Datapath	130.0	130.0	0.5x	n/d	
06/01/09	Globecomm Systems	Telaurus Communications LLC	6.5	6.5	0.5x	n/d	
				Mean	2.3x	16.1x	
Aerospace and Defense							
04/23/07	Kratos	SYS Technologies	49.3	49.3	0.6x	n/m	
05/03/07	Globecomm	GlobalSat	18.4	18.4	0.9x	n/d	
07/31/07	LMI Aerospace, Inc.	D3 Technologies, Inc.	65.0	65.0	1.0x	7.2x	
11/29/07	Finmeccanica SPA	VEGA Group PLC	59.2	56.2	0.9x	9.6x	
05/12/08	Finmeccanica SPA	DRS Technologies Inc	3,358.0	4,930.0	1.4x	11.0x	
05/13/08	Cobham plc	M/A-COM	425.0	425.0	0.9x	6.8x	
06/04/08	Cobham plc	Sparta Inc	416.0	416.0	1.4x	12.1x	
12/16/08	Sierra Nevada Corporation	SpaceDev, Inc.	31.7	26.6	0.7x	23.3x	
				Mean	1.0x	11.7x	
Video Distribution							
11/18/05	Cisco	Scientific Atlanta	6,900.0	5,300.0	2.7x	13.2x	
02/08/06	Tandberg Television	Skystream	80.0	80.0	2.6x	n/d	
12/21/06	Motorola	Tut Systems	39.0	39.0	1.0x	n/d	
04/23/07	Motorola	Terayon Communication Systems Inc.	139.7	127.2	1.9x	n/m	
12/07/07	Macrovision Corp	Gemstar-TV Guide Intl Inc	2,842.1	2,325.1	3.7x	21.9x	
03/12/09	Harmonic	Scopus Video Networks	78.3	47.6	0.8x	n/m	
				Mean	2.1x	17.6x	
Towers							
05/04/05	American Tower	Spectrasite	3,100.0	3,800.0	10.2x	17.0x	
03/17/06	Crown Castle	Trintel Communications	145.0	145.0	10.1x	n/d	
03/17/06	SBA Communications Corp	AAT Communications Corp	1,002.0	1,002.0	12.0x	17.9x	
05/08/06	Crown Castle	Mountain Union Telecom LLC	309.0	309.0	11.9x	n/d	
10/06/06	Crown Castle	Global Signal	4,000.0	5,800.0	12.1x	26.6x	
07/21/08	SBA Communications Corp	Optasite Towers	253.2	428.2	14.8x	n/m	
				Mean	11.8x	20.5x	
General Telecom (Wireless)							
02/17/04	Cingular	AT&T Wireless	\$40,770.0	\$47,105.0	2.8x	10.7x	
12/15/04	Sprint Corp	Nextel Communications Inc	28,449.0	36,200.0	2.7x	7.1x	
01/05/05	Alltel	Western Wireless	4,300.0	6,181.0	3.2x	10.7x	
07/01/05	Sprint Nextel Corporation	US Unwired, Inc.	1,000.0	1,266.0	2.9x	13.2x	
03/06/06	AT&T (new)	Bell South	67,000.0	89,000.0	4.3x	10.7x	
				Mean	3.2x	10.5x	
Television							
03/31/05	Lin TV Corp.	WNDY-TV, WWHO-TV	\$85.0	\$85.0	4.3x	12.9x	
05/10/05	Various Acquirors (d)	Emmis Comm TV Portfolio	1,350.0	1,350.0	5.2x	14.6x	
06/30/05	Univision Communications	WLII (2 TV Stations in Puerto Rico)	190.0	190.0	4.0x	16.7x	
01/18/07	Citadel Investment Group LLC	ION Media Networks Inc	98.8	1,654.3	7.1x	16.9x	
03/29/07	Umbrella Holdings LLC	Univision Communications	12,300.0	13,700.0	6.3x	18.1x	
				Mean	5.4x	15.8x	
Radio							
07/29/08	Sirius Satellite Radio Inc.	XM Satellite Radio Holdings Inc.	2,301.7	3,957.7	3.4x	n/m	
07/30/08	Bain Capital	Clear Channel	17,923.8	23,724.1	3.5x	10.8x	
05/29/09	Cox Enterprises, Inc	Cox Radio	381.5	704.3	1.8x	6.2x	
				Mean	2.9x	8.5x	
New Media							
03/15/07	Cisco	WebEx	2,900.0	2,900.0	7.6x	29.3	
01/31/08	Amazon.com	Audible	280.7	257.0	2.4x	n/m	
02/11/08	Microsoft	Danger	-	500.0	8.9x	n/m	
03/04/08	Demand Media	Pluck	-	75.0	7.5x	n/d	
03/11/08	Google	DoubleClick	3,100.0	3,100.0	10.3x	62.0x	
05/28/08	comScore	M:Metrics	-	44.3	4.0x	n/d	
05/15/08	CBS	CNET	1,800.0	1,800.0	4.4x	n/m	
07/02/08	Hellman & Friedman LLC	Getty Images Inc.	2,028.1	1,977.1	2.3x	7.0x	
03/05/09	Barnes and Noble	Fictionwise	15.7	15.7	8.7x	n/d	
				Mean	5.8x	27.0x	

(a) When Equity Value was not disclosed, Transaction Value was used

(b) Calculated as Value of Equity plus interest bearing liabilities and preferred stock, less cash & equivalents

(c) Transaction includes the divestiture of Emmis' TV portfolio to: Lin TV (\$260M), Journal Comm (\$235M), Gray (\$186M), Blackstone (\$259M)

It also includes estimated transaction value of \$410M for the final sale of 3 TV stations.

n/d Not Disclosed

n/m Not Meaningful

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