

December 15, 2009

GLOBAL

## The Mobile Internet Report

Ramping Faster than Desktop Internet, the Mobile Internet Will Be Bigger than Most Think

**Material wealth creation / destruction should surpass earlier computing cycles.** The mobile Internet cycle, the 5th cycle in 50 years, is just starting. Winners in each cycle often create more market capitalization than in the last. New winners emerge, some incumbents survive – or thrive – while many past winners falter.

**The mobile Internet is ramping faster than desktop Internet did,** and we believe more users may connect to the Internet via mobile devices than desktop PCs within 5 years.

**Five IP-based products / services are growing / converging** and providing the underpinnings for dramatic growth in mobile Internet usage – 3G adoption + social networking + video + VoIP + impressive mobile devices.

**Apple + Facebook platforms serving to raise the bar** for how users connect / communicate – their respective ramps in user and developer engagement may be unprecedented.

**Decade-plus Internet usage / monetization ramps** for mobile Internet in Japan plus desktop Internet in developed markets provide roadmaps for global ramp and monetization.

**Massive mobile data growth is driving transitions** for carriers and equipment providers.

**Emerging markets have material potential for mobile Internet user growth.** Low penetration of fixed-line telephone and already vibrant mobile value-added services mean that for many EM users and SMEs, the Internet will be mobile.

**We use a data-rich, theme-based framework** for thinking about how the rapidly emerging / changing mobile Internet may evolve. One thing is clear: new computing cycles create / destroy material wealth – and the mobile Internet cycle should be no different. For our compilation of *well positioned / potentially challenged / unclearly positioned companies*, see pages 11-13.

*This report is structured as a PowerPoint presentation based on the 8 themes highlighted to the right. Each theme is preceded by an overview that sets the stage for the slides. Additionally, we compiled 'The Mobile Internet Report Setup' presentation (pages 9-59), which highlights the key takeaways of our work. This report is optimally viewed on a screen or as a color print out.*

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### Key Themes

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To purchase a printed copy of *The Mobile Internet Report*, please go to [www.morganstanley.com/mobileinternetbook](http://www.morganstanley.com/mobileinternetbook) or contact your Morgan Stanley representative.

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**For analyst certification and other important disclosures, refer to the Disclosure Section, located at the end of this report.**

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*We acknowledge the contributions of Ravi Lath to this report.*

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## 8) Regulators Can Help Advance / Slow Mobile Internet Evolution

**On balance, regulation may be favorable to mobile internet development**, since open access for devices and content should drive innovation. If mobile operators are not allowed to block or degrade bandwidth-intensive applications – so-called “net neutrality” – innovation and investment in new applications, services, and content are likely to follow. Capping international data roaming charges should encourage usage, especially in Europe, while increasing spectrum availability and encouraging its efficient use should help expand carrier capacity.

**But regulators can also slow down the mobile Internet.** Forcing carriers to provide copyright protection or cut off persistent illegal file sharing could impose costly overhead. Zoning laws affecting tower deployment could slow 3G rollout, and high 3G license prices or standards confusion could set bad precedents for rollout / adoption in emerging markets. The positive outcomes from successful resolution of some of these issues – such as easier payment mechanisms once piracy is controlled – should create incentives for both the state and all other parties to reach compromises soon.

Although the FCC in the US has issued a notice for proposed rulemaking, the first step in furthering enforcement of net neutrality, we expect this process will take time – even decades, just as it took many rounds of legal and

administrative reviews for deregulation of the US wireline industry in the 1950s and 1960s. As principles of free choice and transparency emerge, we expect tiered pricing to become the norm across the carrier industry, as the best way to manage traffic – and enhance mobile data ARPU.

**In China, the Ministry of Industry and Information Technology is using 3G licensing to create a more competitive wireless market**, develop a native telecom standard, and stimulate the domestic economy. The potential outcomes would include more wireless options for the world's biggest Internet population, leveling the playing field for China's wireless carriers and stimulating domestic industry through increased bargaining power with foreign patent holders and more business for ZTE, Huawei, MediaTek, HTC, and other firms. In India, the government has set the starting bid prices for 3G and WiMax spectrum to bring efficient mobile broadband to one of the world's largest and fastest growing telecommunications networks.

In Europe, the UK has proposed a law to suspend the Internet accounts of persons convicted of persistent online piracy and file-sharing, analogous to similar proposals in France and Sweden. France, Germany, and the UK are also planning significant auctions of wireless spectrum in the months ahead.

## Key Theme #8

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## Key Theme #8

- 1) **Wealth Creation / Destruction is Material in New Computing Cycles – Now in Early Innings of Mobile Internet Cycle, the 5th Cycle of Last Half Century.**
- 2) **Mobile Ramping Faster than Desktop Internet Did and Will Be Bigger Than Most Think – 5 Trends Converging (3G + Social Networking + Video + VoIP + Impressive Mobile Devices).**
- 3) **Apple Leading in Mobile Innovation + Impact, for Now – Depth of App Ecosystems + User Experience + Pricing Will Likely Determine Long-Term Winners.**
- 4) **Game-Changing Communications / Commerce Platforms (Social Networking + Mobile) Emerging Very Rapidly.**
- 5) **Growth / Monetization Roadmaps Provided by Japan Mobile + Desktop Internet.**
- 6) **Massive Data Growth Driving Carrier / Equipment Transitions.**
- 7) **Compelling Opportunities in Emerging Markets.**
- 8) **Regulators Can Help Advance / Slow Mobile Internet Evolution.**

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## Key Theme #8 – Regulators Can Help Advance / Slow Mobile Internet Evolution

Regulation, in general, is favorable to mobile Internet development, in our view. Net neutrality trends in the US appear especially positive for applications, services, and content, though they may be negative for ISPs and carriers.

Drags include potential overhead for carriers to provide copyright protection, zoning laws, and high spectrum prices in emerging markets.

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## Key Regulatory Issues for Mobile Internet

### **Potential Supports:**

1. Net neutrality enforcement = key to drive decentralized mobile Internet innovation. Key question is whether regulators allow continued blocking of bandwidth-intensive apps on mobile or leave it to mobile operators to adopt tiered bandwidth pricing.
2. International data roaming price ceilings (SMS rates reduced to €0.11 per text message vs. regional average of €0.28 / data roaming capped at €1 per MB for travelers roaming within the European Union, which was not capped before) put into effect in 7/09, should encourage mobile Internet usage, particularly in Europe.
3. Increasing spectrum availability via the digital dividend (spectrum becomes available as cable TV is converted from analog to digital terrestrial) + spectrum "refarming" (reallocating spectrum bands to higher value uses) and new license auctions (especially in emerging markets such as China + India) would increase capacity on carrier networks.

### **Potential Drags:**

1. Copyright protection – proposed laws (in France, UK, Sweden) to cut off persistent illegal file sharers could negatively impact innocent mobile Internet users who share an IP address with illegal file sharers (common in urban markets). While these proposed laws may encourage the development of mobile payment systems (as carriers create business models for legal file sharing / content delivery), they could also increase overhead for carriers.
2. Zoning laws could continue to slow 3G network rollout – network sharing (as shown by Vodafone + O2 in W. Europe) may be a partial answer. In addition, there is potential for consumer pushback as 3G becomes more relevant for mobile users.
3. China / India 3G licenses (issued in 1/09 / expected in CQ4:09E, respectively) reshape the competitive landscape for carriers. High license prices or standards confusion could impede rollout / adoption.

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Source: ZDNet, Morgan Stanley Research.

## Net Neutrality – Key to Decentralized Mobile Internet Innovations

### *Basic Components of Wireless Net Neutrality*

- **Open access for all devices** – The 1968 *Carterfone* rule in the US wireline industry allowed any consumer to attach any safe device to his / her phone line through a standardized jack. The same principle for wireless, if adopted, would liberate device innovation / shorten development cycles / provide more choices for consumers + developers (via unlocked devices).
- **Open access for all content / applications** – On wireline broadband, consumers have the basic right to choose the applications they use and the content they view. However, on mobile, carriers can restrict the type of applications (such as VoIP) and content (such as live TV streaming) that consumers can use on the 3G networks.
- **Open disclosure** – Wireless carriers should bear the responsibility of disclosing to consumers the details of network coverage / rate plan information, limits on devices / bandwidth usage, and whether devices are locked to a single network.

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Source: Tim Wu, Columbia Law School, "Wireless Net Neutrality: Cellular Carterfone and Consumer Choice in Mobile Broadband", 2/07.Morgan Stanley Research.

## Net Neutrality Will Take Time – Tiered Pricing Should Manage Traffic / Drive ARPU

- ***We expect the regulatory framework for wireless networks to eventually mimic wireline regulations...***
  - ...although this process could take decades and involve numerous rounds of legal / administrative reviews (as in US wireline industry deregulation in the 1950s-1960s).
- ***Tiered pricing of mobile service likely to become the norm across the carrier industry***
  - Mobile networks are arguably more sensitive to usage than wireline networks – a heavy user positioned close to a 3G base station should enjoy excellent service, but her use of the service shrinks the size of the cell, which can create significant problems for the network. Tiered pricing is the best mechanism to manage traffic.
- ***Tiered pricing could become a profit center over time, not just a network management tool***
  - As consumers use more online video such as YouTube, or download applications/music more frequently, the 1GB starter packages available today will become inadequate. Carriers will likely have an opportunity to upsell / bundle different tiers of services to drive mobile data ARPU.

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## In the US, FCC Has Issued a “Notice of Proposed Rulemaking” to Enforce Net Neutrality Based on Six Principles of Open Internet

- The FCC recently announced it is changing its focus from providing broadband access to all consumers to ensuring that all consumers who have broadband are able to consume the content / applications / services they want without restriction on any network (wired or wireless). It is important to note that service providers will still be able to “reasonably” manage their networks.
- The FCC released a Notice of Proposed Rulemaking for net neutrality on 10/22/09, based on six principles:
  - Consumers are entitled to access the lawful Internet content of their choice.
  - Consumers are entitled to run applications and use services of their choice, subject to the needs of law enforcement.
  - Consumers are entitled to connect their choice of legal devices that do not harm the network.
  - Consumers are entitled to competition among network providers, application and service providers, and content providers.
  - Broadband providers cannot discriminate on the basis of internet content or applications.
  - Providers of internet access must be transparent about their network management practices.

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Note: The first four principles were originally outlined in an FCC policy statement given on 8/5/05, and the final two in a statement by the FCC chairman on 9/21/09. Source: FCC, Brookings Institution, Morgan Stanley Research.

## FCC Net Neutrality Principles Provide Opportunities for Content + Applications / Challenges for ISPs + Carriers

**Potential winners from net neutrality rules** – Applications / services / content:



- Skype (whose VoIP app has been allowed to work on AT&T's 3G network post the FCC proposal to enforce net neutrality)



- Google (whose Voice + Latitude apps have been denied entry to the iPhone app store, due to replication of core iPhone applications)



- Video Streaming, such as Slingbox (whose apps have been blocked from the iPhone store because of network congestion fears)

**Potentially challenged by net neutrality rules** – ISPs / carriers:



- Comcast / other broadband ISPs (who have been battling the FCC over full disclosure of network management practices, such as curbing P2P usage)



- AT&T / other wireless carriers (who do not fully disclose their network management practices, and whose exclusivity of certain handsets, especially the iPhone, would come into question under net neutrality)

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Source: Company Reports, Morgan Stanley Research.

## Both Sides of Net Neutrality Debate See Different Paths to “Open Internet” that Promote Competition + Innovation

### Pro-Net Neutrality Regulation Perspective – Applications / Content Providers

- **Breaking Down Walled Gardens Sets Consumer Free** – Enforcing net neutrality would allow consumers to choose whichever device / applications / content they want and use them on the best platform available. In turn, this would increase mobile Internet usage and fuel competition / investment.
- **Open Internet Promotes Investment** – Net neutrality for the mobile Internet would allow handset device manufacturers, application and content developers, and service providers to develop products to run on all networks rather than being confined to a single “walled garden” or mobile ecosystem. Opening up development to such a massive user base would spur investment and promote innovation.
- **Consumers Deserve to Know What They’re Paying for** – Consumers often don’t realize that their usage is restricted for certain activities and that certain content and applications are blocked from their device. Enforcing free disclosure of network management practices levels the playing field and allows consumers to decide which service suits their needs best.

### Anti-Net Neutrality Regulation Perspective – Carriers / ISPs

- **Net Neutrality Regulations Could Erode Carrier ROI** – Wireless carriers have made significant investment in spectrum (net winning bids on recent 700 MHz spectrum = ~\$19B in the US) and network equipment. Enforcing net neutrality regulations could reduce carriers’ ability to monetize their subscriber base and retain customers, which could lead to lower ROI and inhibit future investment.
- **Network Management Benefits Carriers + Consumers** – Network management practices that block spam + viruses / prioritize traffic so that high bandwidth users don’t block out others, preventing network congestion and improving the user experience.
- **Competition Is Best Path to Open Internet** – Competition between carriers / operating systems / content + application providers will eventually lead to a more open Internet without carrier restrictions. Ultimately, customers will choose carriers that offer the widest variety of content + services at best price / on best network.
- **Regulation Stifles Investment + Innovation** – Regulations often slow innovation as bureaucracy and government get in the way of making investments.

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Source: Morgan Stanley Research.

## Carriers’ Perspective – Network Management Crucial for the Greater Good

### 50x Data Growth Over Past 3 Years

Net neutrality encourages excessive data use –

In its response to the FCC’s net neutrality efforts, AT&T highlighted data growth of +4,932% over the past three years to show the strain its network is absorbing. Net neutrality would contribute to this growth by giving users access to more data-heavy applications, thus making AT&T’s network more constrained.

### Less than 3% of Users Consume 40% of Data

Small share of heavy data users consume a large share of the network –

The top 3% of AT&T smartphone users account for 40% of all smartphone data / consume 13x as much data as average smartphone customers / represent less than 1% of AT&T’s total postpaid subscriber base.

### 0.0004% Wireless Bandwidth vs. Fiber

Speed / capacity on wireless networks makes it difficult to handle this increase in traffic –

Wireless capacity is constrained by limited spectrum / relatively low data speeds. Even next generation networks have significantly lower throughput speeds than fixed broadband (LTE theoretical speed = ~100 Mbps\* vs. Fiber theoretical speed = ~25MM Mbps). As a result, a few heavy data users can crowd out all of the other users on the network.

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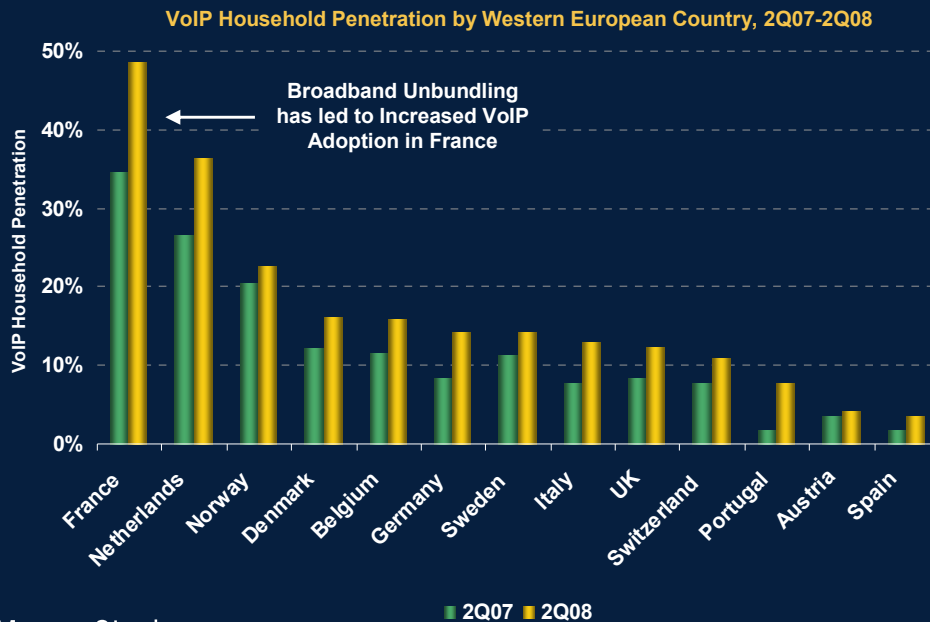
\* LTE speed assumes at least 2X10MHz. Source: AT&T, CTIA, Morgan Stanley Research.

## What Could Regulators Do to Accelerate Adoption of Mobile Internet?

- Enforce network neutrality by
  - Attaching mandatory 'open' clause to future wireless spectrum auctions / allowing usage of unlicensed spectrums
  - Bringing *Carterfone* doctrine to the mobile industry / eliminating discriminatory services for content + applications providers / investigating exclusive device agreements
  - Requiring more detailed disclosure from carriers on pricing plans / Term of Usage limits
- Lower entry barriers in the wireless industry by
  - Eliminating / subsidizing spectrum costs
  - Eliminating / subsidizing wireless carrier capex spending (via utility tax)
  - Lowering mobile termination / roaming costs
  - Opening carrier networks to virtual operators

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## Regulations Do Make a Difference – Broadband Unbundling Regulations = Key VoIP Adoption Drivers in France



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Note: Regulations were passed in 12/00 that provided unbundled access to the local loop in European markets. Large scale unbundling became material in France and other markets in 2004. Source: TeleGeography, Morgan Stanley Research.

## Lower Mobile Data Roaming Fees = Encourage Usage Take-Off in Western Europe

- **EU (European Union) Extends Roaming Regulations to Include SMS + Data** – In 7/09, the EU agreed to extend caps on roaming charges to SMS and Data Usage for consumers who are travelling in other member states. This increases the value of a mobile data subscription to business and private consumers, in our view.
- **SMS Roaming Fee Cap** – New regulations limit the price for sending a text message (unlike the US, receiving a message is free for EU consumers) while abroad to €0.11 vs. prior regional average of €0.28.
- **Data Roaming Fee Cap** – New regulations limit the price for data usage while abroad to €1 per megabyte. This limit will decrease to €0.80 per megabyte in 2010 and €0.50 per megabyte in 2011.
- **Bill Shock Protection** – By 3/10, carriers are required to install automatic data roaming cap of €50/month.
- **Roaming Fee Disclosure** – Carriers also required to adequately inform consumers of the charges that apply for data roaming services.

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## Copyright Protection in the Mobile Internet Era

Who should have responsibility for protecting copyright holders? Courts do not have time to haul in the millions of ordinary users who pilfer copyright material online. Should the onus be imposed on carriers/ISPs, or should it be given to a specific enforcement authority, with the ability to cut off Internet service and impose jail terms, or are existing legal provisions adequate?

- ***The more successfully piracy is controlled, the easier mobile payment models will become to use***
  - Consumers who want to pay for content are more likely to do so via a simple payment system requiring many fewer keystrokes than credit card entry on the fixed internet. eBay's PayPal could be particularly suited to the mobile internet. In the developing world, where credit cards and bank accounts are less prevalent, operators have an opportunity to leverage the prepaid account balances that already form the core of the money transfer market (e.g. Vodafone's MPESA in Kenya).
- ***Overhead cost on carriers/ISPs from legal issues?***
  - As the legal position develops, carriers/ISPs may have growing responsibility for the content downloaded through them. This seems likely to create overhead costs in monitoring and, if necessary, blocking offensive or illegal material. At this stage it is not clear how much of these costs will be borne by the state, by responsibilities imposed on the carrier/ISP or by specific taxes. IT overheads could lead to further scale economies in carriers/ISPs, providing momentum towards consolidation.

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## “Not in My Back Yard” (NIMBY) Protest Against Cell Site Construction – Slowing Network Rollout Despite High Demand for Bandwidth

Area residents across the country have opposed the construction of cell towers in their neighborhoods



### Reasons for Opposing Cell Tower Construction –

- Negative aesthetic impact
- Reduced property value
- Adverse impacts on surrounding environment
- Negative health risks associated with cellular microwaves

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Tower / telecom companies have turned to “stealth towers” that disguise a cell tower as a more aesthetically appealing object



Cell towers disguised as trees, flagpoles, water tanks and other objects address some (aesthetic impact, reduced property values), but not all of the issues associated with cell tower construction

Source: Gizmodo, Business Week, Morgan Stanley Research.

## US Zoning Regulations – Health / Environment Issues + Lost Property Value Creating Obstacles for Wireless Network Rollout

- In the United States, wireless carriers have had difficulty building out their networks in certain residential areas because residents have opposed towers being built “in their back yard,” citing potential adverse health effects / property value depreciation / negative aesthetic impact.
- Currently, there are roughly 3,300 pending siting applications. 25% of the applications have been awaiting approval for over a year and more than 180 for over three years, per a 2008 CTIA survey.
- The FCC approved tower siting “shot clock” rules in 11/09, requiring local authorities to grant / deny cell tower approval within a period of 90 days for co-located towers (shared by multiple operators) or 150 days for new towers, alleviating the problems that delays have caused in the past.
- Section 704 of the US Telecommunications Act of 1996 governs federal, state, and local oversight of cell site location for “personal wireless service” facilities. The Act established a framework for state and local zoning authorities’ jurisdiction over the construction, modification, and placement of cell towers. While local zoning authorities are able to prohibit certain cell site locations, the law gave the FCC the ability to preempt that authority if deemed necessary.
- Recently, many local authorities have contested Section 704 regulations and believe they should have the ability to prohibit cell site construction based on the negative environmental and human health-related impacts of wireless technologies that they perceive. Local authorities in Los Angeles and Portland, OR, recently took measures against Section 704 health preemption and are calling on the FCC to change its regulations.

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Source: FCC, Morgan Stanley Research.

## 3G Licenses Reshape China's Competitive Landscape – Create Opportunity in Domestic Value Chain

- **China's Ministry of Industry and Information Technology issued three 3G licenses in 1/09**
  - China Mobile will operate TD-SCMA network (Chinese standard) / China Unicom – WCDMA (European standard) / China Telecom – CDMA EVDO (US standard)
- **Implies potential massive share shift based on 1/09 Sina poll of 200,000 people**
  - ~40% would choose China Mobile for 3G services / 35% – China Telecom / 25% – China Unicom; note that this compares with current subscriber market share of 75% for China Mobile / 4% for China Telecom / 21% for China Unicom
  - #3 player has most easily upgradeable service (CDMA EVDO), #2 player has best/most widely adopted (WCDMA), leader has worst/least widely adopted
- **Regulator's goals** – Create more competitive wireless market, develop native telecom standard, stimulate domestic economy
- **Key potential outcomes** –
  - More wireless options for biggest Internet population (298MM total, 118MM mobile users) – current Wi-Fi ban limits choice of services
  - Level playing field for China's wireless carriers
  - More bargaining power in future negotiations with foreign patent holders
  - Increased business for ZTE, Huawei, MediaTek, HTC, etc.

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## India 3G Network Regulations Now Settled – Spectrum Auctions Getting Underway

- Following months of negotiations between the Finance Ministry and the India Telecom Department, the government has set the starting bid prices for 3G and WiMAX Spectrum
- 3G and WiMAX networks will aim to bring efficient mobile broadband capability to one of the world's largest and fastest growing telecommunications networks
- In 8/09, India set 35B Indian rupees (~\$716MM) as the starting auction price for each of its four 3G wireless spectrum slots
  - The government has already allotted a 3G slot to state-run BSNL
  - The four spectrums on auction will be bid on by other telecom operators, including domestic companies (Bharti Airtel / Reliance Communications / Idea Cellular / Vodafone Essar) and foreign providers (Telenor / Emirates Telecommunications / NTT docomo)
- India also set the base price at 17.5B Indian rupees (~\$358MM) for each of its 3 WiMAX spectrum slots

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Source: Vinay Jaising, Morgan Stanley Research.

## Recent Developments – USA

- USA
  - **FCC to deliver National Broadband Plan in 2/10** – The National Broadband Plan seeks to outline initiatives for delivering fixed and mobile broadband to consumers nationwide. Mobile broadband could benefit from this plan by receiving larger spectrum allocations / stimulus funds for expanding mobile broadband coverage and capacity.
  - **FCC plans to impose “shot clock” timetable for tower construction / zoning (10/09)** – The FCC is working to speed up wireless rollouts by cutting through the red tape surrounding new tower deployments. Local community zoning boards will be forced to make decisions on tower sites in a much shorter amount of time once the “shot clock” rules are in place.
  - **FCC seeks to make more spectrum available for wireless broadband (10/09)** – The FCC opened a request for comments on how to allocate more spectrum to wireless carriers, as the CTIA and others in the wireless industry believe there is a spectrum shortfall for the mobile web. The ITU estimates that the US will need 800 MHz of spectrum available for mobile voice and data traffic by 2010, while only 409.5 MHz are currently available.
  - **FCC sets guidelines for net neutrality (9/09)** – The FCC Commissioner outlined six principles that the commission hopes to codify as official rules governing the “Open Internet.” Enforcing net neutrality would break down the walled gardens that companies such as Apple and AT&T have erected.

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Source: FCC, Morgan Stanley Research.

## Recent Developments – Western Europe

- Western Europe
  - **Creation of a new pan-European telecom regulator (11/09)** – A new agency, the Body of European Regulators for Electronic Communications (BEREC), was created to oversee the regulatory bodies in EU member countries. BEREC has the power to veto decisions by national regulators to help ensure that all countries in the EU play by the same rules.
  - **UK proposes law to suspend Internet accounts of filesharers** – Following similar proposals in France and Sweden, the UK government is planning to enact a “three strikes” law against online piracy and filesharing. Three-time offenders would have their Internet access rights suspended.
  - **France to auction fourth wireless spectrum** – France’s upcoming 3G spectrum auction (1H10E) has been priced at ~\$340 million and will likely result in a fourth wireless carrier entering the market (thought to be either Iliad Free or Virgin Mobile).
  - **Germany expected to auction massive amount of 4G spectrum in late 2009E** – German regulator Bundesnetzagentur (BNetzA) plans to auction 340 MHz of spectrum (compared to 65 MHz in 2000) for use in Long-Term Evolution (LTE) networks.
  - **UK plans significant auction for 2010E** – UK regulator Ofcom is planning to auction 262 MHz of spectrum next year, a significant network rollout compared to operators’ current spectrum holdings of 332 MHz.

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Source: Iliad, Ofcom, Morgan Stanley Research.

## Recent Developments – China / India

- China
  - **3G licenses** – The Ministry of Industry and Information Technology awarded three 3G licenses in 1/09. China Mobile has been awarded the license for the Chinese technology, TD-SCDMA, China Telecom received a CDMA2000 license, and China Unicom received a WCDMA license.
- India
  - **3G / Broadband auctions forthcoming** – After much delay, India's 3G and wireless broadband spectrum auctions are expected to take place in CH1:10E. This marks the first 3G spectrum to be sold in India.

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## Disclosure Section

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## Global Stock Ratings Distribution

(as of November 30, 2009)

For disclosure purposes only (in accordance with NASD and NYSE requirements), we include the category headings of Buy, Hold, and Sell alongside our ratings of Overweight, Equal-weight, Not-Rated and Underweight. Morgan Stanley does not assign ratings of Buy, Hold or Sell to the stocks we cover. Overweight, Equal-weight, Not-Rated and Underweight are not the equivalent of buy, hold, and sell but represent recommended relative weightings (see definitions below). To satisfy regulatory requirements, we correspond Overweight, our most positive stock rating, with a buy recommendation; we correspond Equal-weight and Not-Rated to hold and Underweight to sell recommendations, respectively.

Stock Rating Category	Coverage Universe		Investment Banking Clients (IBC)		
	Count	% of Total	Count	% of Total IBC	% of Rating Category
Overweight/Buy	915	38%	284	41%	31%
Equal-weight/Hold	1077	45%	312	45%	29%
Not-Rated/Hold	25	1%	2	0%	8%
Underweight/Sell	384	16%	89	13%	23%
Total	2,401		687		

Data include common stock and ADRs currently assigned ratings. An investor's decision to buy or sell a stock should depend on individual circumstances (such as the investor's existing holdings) and other considerations. Investment Banking Clients are companies from whom Morgan Stanley or an affiliate received investment banking compensation in the last 12 months.

## Analyst Stock Ratings

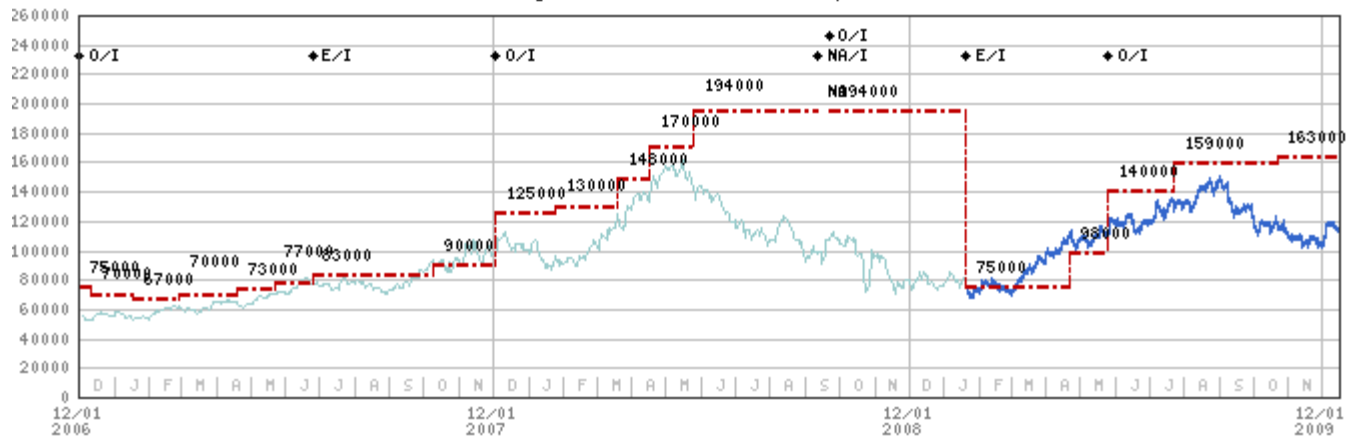
Overweight (O). The stock's total return is expected to exceed the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.  
 Equal-weight (E). The stock's total return is expected to be in line with the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.  
 Not-Rated (NR). Currently the analyst does not have adequate conviction about the stock's total return relative to the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.  
 Underweight (U). The stock's total return is expected to be below the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.  
 Unless otherwise specified, the time frame for price targets included in Morgan Stanley Research is 12 to 18 months.

## Analyst Industry Views

Attractive (A): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be attractive vs. the relevant broad market benchmark, as indicated below.  
 In-Line (I): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be in line with the relevant broad market benchmark, as indicated below.  
 Cautious (C): The analyst views the performance of his or her industry coverage universe over the next 12-18 months with caution vs. the relevant broad market benchmark, as indicated below.  
 Benchmarks for each region are as follows: North America - S&P 500; Latin America - relevant MSCI country index or MSCI Latin America Index; Europe - MSCI Europe; Japan - TOPIX; Asia - relevant MSCI country index.

## Stock Price, Price Target and Rating History (See Rating Definitions)

LG Electronics (066570.KS) - As of 12/14/09 in KRW  
Industry : S. Korea Hardware Components



Volatility shading indicates "more volatile" (V) flag. As of Nov-14-2008 the V flag has been discontinued.

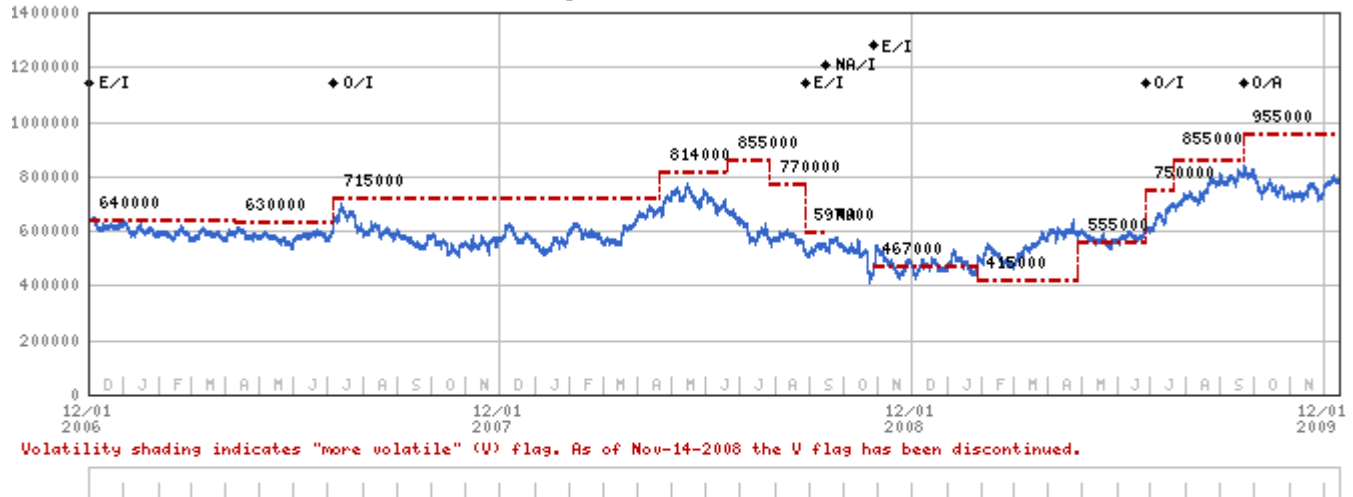
Stock Rating History: 12/1/06 : O/I; 6/25/07 : E/I; 12/3/07 : O/I; 9/12/08 : NA/I; 9/22/08 : O/I; 1/20/09 : E/I; 5/26/09 : O/I

Price Target History: 10/18/06 : 75000; 12/12/06 : 70000; 1/18/07 : 67000; 2/28/07 : 70000; 4/20/07 : 73000; 5/22/07 : 77000; 6/25/07 : 83000; 10/10/07 : 90000; 12/3/07 : 125000; 1/25/08 : 130000; 3/20/08 : 148000; 4/17/08 : 170000; 5/26/08 : 194000; 9/12/08 : NA; 9/22/08 : 194000; 1/20/09 : 75000; 4/22/09 : 98000; 5/26/09 : 140000; 7/23/09 : 159000; 10/22/09 : 163000

Source: Morgan Stanley Research Date Format : MM/DD/YY Price Target --- No Price Target Assigned (NA)  
 Stock Price (Not Covered by Current Analyst) --- Stock Price (Covered by Current Analyst) ---  
 Stock and Industry Ratings (abbreviations below) appear as ♦ Stock Rating/Industry View  
 Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) More Volatile (V) No Rating Available (NA)  
 Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

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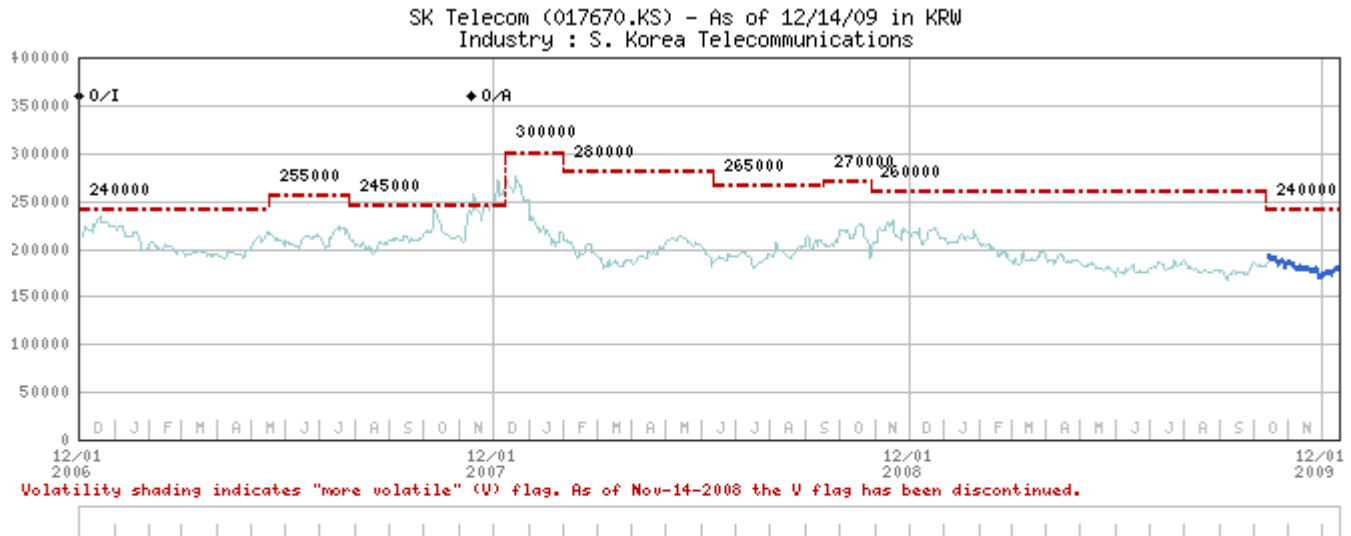
Samsung Electronics (005930.KS) - As of 12/14/09 in KRW  
Industry : S. Korea Semiconductors



Stock Rating History: 12/1/06 : E/I; 7/6/07 : O/I; 8/28/08 : E/I; 9/16/08 : NA/I; 10/27/08 : E/I; 6/26/09 : O/I;  
9/21/09 : O/A  
Price Target History: 6/23/06 : 640000; 4/10/07 : 630000; 7/6/07 : 715000; 4/21/08 : 814000; 6/20/08 : 855000;  
7/28/08 : 770000; 8/28/08 : 597000; 9/16/08 : NA; 10/27/08 : 467000; 1/28/09 : 415000; 4/27/09 : 555000;  
6/26/09 : 750000; 7/21/09 : 855000; 9/21/09 : 955000

Source: Morgan Stanley Research      Date Format : MM/DD/YY      Price Target ---      No Price Target Assigned (NA)  
Stock Price (Not Covered by Current Analyst) — Stock Price (Covered by Current Analyst) ■  
Stock and Industry Ratings (abbreviations below) appear as ♦ Stock Rating/Industry View  
Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) More Volatile (V) No Rating Available (NA)  
Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

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Stock Rating History: 12/1/06 : O/I; 11/12/07 : O/A

Price Target History: 10/27/06 : 240000; 5/18/07 : 255000; 7/27/07 : 245000; 12/12/07 : 300000; 2/1/08 : 280000; 6/12/08 : 265000; 9/17/08 : 270000; 10/29/08 : 260000; 10/12/09 : 240000

Source: Morgan Stanley Research      Date Format : MM/DD/YY      Price Target --      No Price Target Assigned (NA)  
 Stock Price (Not Covered by Current Analyst) — Stock Price (Covered by Current Analyst) —  
 Stock and Industry Ratings (abbreviations below) appear as ♦ Stock Rating/Industry View  
 Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) More Volatile (V) No Rating Available (NA)  
 Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

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