



KEY FINDINGS

Sprint has unveiled its bold Network Vision initiative to deploy a new nationwide network of multi-mode base stations to support its 2G, 3G voice, data, direct connect and 4G mobile broadband services

Sprint has partnered with three world class wireless technology leaders, Alcatel-Lucent, Ericsson and Samsung, to enhance the mobile experience of consumer, business and enterprise customers

Sprint is once again first to deploy a common converged mobile network to strengthen its 3G voice and data services; expand 4G technology options, while continuing to deliver the industry's leading Push-to-Talk services.

Sprint's strategy is based on a sound business case in which an incremental \$4-5 billion investment over 3-5 years will yield \$10 - \$11 billion in projected CAPEX and OPEX savings over a 7 year period.

Heavy Reading believes **Sprint's Network Vision plan sets a new industry benchmark** for customer-driven mobile network evolution in the 4G decade ahead.

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Assessment of Sprint's Network Vision Initiative

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Executive Summary

Mobile operators around the world are investing billions in the spectrum and network infrastructure to deploy 4G networks, even though most have yet to deliver a sufficient return on their 3G network investments. In the race to 4G, US mobile operators have been driven by competition to invest in multiple network platforms, maintaining their legacy infrastructure while deploying new IP-based mobile broadband networks. For example, the LTE network being launched commercially by Verizon Wireless has been deployed as an "overlay" to its existing native CDMA network, using many existing cell sites and backhaul infrastructure.

The mobile industry is now at a tipping point where this strategy may no longer be sustainable, as the deployment and maintenance of multiple overlay networks drives up both capital and operating expenses. These wireless network infrastructure overlays create complexity in radio access and backhaul networks, service platforms and ultimately the protocols and frequency bands that must be supported in end user mobile devices.

As a result of its merger with Nextel, Sprint currently operates separate networks for its three major service offerings:

- iDEN for nationwide Push-to-Talk network using 800 MHz spectrum with 30,000 cell sites
- 2G CDMA 1xRTT and 3G EV-DO Rev A for national voice and data services using 1.9 GHz spectrum with 38,000 CDMA cell sites

Sprint was first with an all-digital wireless network; the first to upgrade to EVDO; and more recently, the first US mobile operator to broadly offer 4G services by reselling the Clearwire 2.5 GHz WiMAX network. But Sprint currently has co-located CDMA and iDEN base stations at only 8,000 of its 68,000 total cell site locations. In addition, only 25% or 3,600 of Clearwire's 14,500 WiMAX base stations in 68 markets are co-located at less than 10% of Sprint's existing 38,000 CDMA cell sites.

With its Network Vision initiative, Sprint is the first mobile operator worldwide committed to deploying new multi-standard base stations with software defined radios as a common platform to converge multiple generations of wireless networks. This plan will allow Sprint to dramatically increase the coverage and capacity of its new converged mobile network with 38,000 cell sites, and decommission 22,000 legacy iDEN network sites. Leveraging new multi-mode base stations and mobile devices with integrated chipsets, Sprint will significantly reduce its operating expenses and optimize the use of its vast spectrum holdings.

Enterprise customers will be the first to experience the benefits of Sprint's mobile network transformation, based on the enhanced coverage for 2G voice, 3G voice and data services, expanded 4G technology options and retooling of the industry's leading push-to-talk services to ensure low latency and group calling features on an expanded range of devices.

1. Sprint Network Vision Plans and Vendor Selection

This White Paper presents Heavy Reading's independent assessment of the Sprint Network Vision initiative announced in December 2010. We have based this analysis on our extensive research on mobile network technology, service provider network strategies, industry trends and customer needs.

Sprint's Network Vision program focuses on the need to converge its mobile networks and reduce operating costs, improve service coverage and enhance customer experience performance in anticipation of the major transformation in the mobile industry expected in the decade ahead. For today's 3G networks, rapid mobile data traffic growth is widening the gap between network investment and mobile broadband revenues. Even with the move by several carriers to implement usage caps and the increased use of caching, Wi-Fi offload and policy management solutions, it is difficult for mobile operators to keep pace with customer demand for higher radio access speeds, backhaul requirements and network capacity. The industry's leading mobile operators must soon face the necessity to drive mobile network convergence, rather than continuing to invest in multiple network platforms, maintaining legacy infrastructure while deploying new overlay IP-based mobile broadband networks.

Sprint currently supports discrete networks for its iDEN push-to-talk, 3G voice and data, and WiMAX 4G services operated by Clearwire, as indicated in Exhibit 1. Since these networks were originally built by separate companies, each requires separate base stations and currently benefits from only minimal synergies due to infrastructure and site sharing arrangements. Sprint currently has co-located CDMA and iDEN base stations at only 8,000 of its 68,000 total cell site locations. In addition, only 25% or 3,600 of Clearwire's 14,500 WiMAX base stations in 68 markets are co-located at less than 10% of Sprint's existing 38,000 CDMA cell sites. As a result, Sprint currently offers less extensive coverage with significantly more base stations and higher operating costs than its primary competitors. In addition, the coverage limitations of its current 3G CDMA network drives up Sprint's roaming costs and dropped calls during network hand-offs reduce customer satisfaction and potentially increase churn rates. This overlay architecture is not sustainable over the next five years, especially as Sprint plans to retire its aging iDEN network equipment, enhance its push-to-talk services, modernize its CDMA voice and EVDO data services and increase the coverage and capacity of its 4G service offerings.

Exhibit 1: Sprint's Mobile Networks Before and After Network Vision Initiative

Source: Heavy Reading and Company Announcements

Current Network Standard	Spectrum Band	Coverage	Cell Sites
3G CDMA 1XRTT EVDO RevA	1900	266M Pops	38,000
iDEN PTT and Boost Mobile	800 MHz	266M Pops	30,000 8,000 co-located
4G WiMAX - Clearwire	2.5 GHz	68 markets 103 M Pops	14,500 3,600 co-located
Total			71,000

Future Services After Network Vision Initiative	Spectrum Band	Coverage	Cell Sites
3G CDMA 1X Advanced Direct Connect PTT	800 MHz	300M Pops	50-57,000
EVDO RevA Data	1.9 GHz		
4G WiMAX	2.5 GHz		
4G LTE	800 MHz or 2.5 GHz		

Rather than continue the deployment and maintenance of multiple overlay networks that inevitably drives up both capital and operating expenses, the Network Vision plan should allow Sprint to dramatically increase the coverage and capacity of its new converged mobile network, decommission 22,000 legacy iDEN network sites and reduce its total footprint to the range of 50-57,000 cell sites. Sprint is the first major mobile operator to commit to a single multi-standard, converged mobile network to strengthen its 3G voice and data services; expand 4G technology options, while continuing to provide the industry's leading push-to-talk (PTT) offering.

By implementing the Network Vision program, Sprint is leveraging the availability of several new technologies that have created the unprecedented opportunity to upgrade mobile network infrastructure while reducing its ongoing operating costs:

- **Multi-mode base stations:** next-generation base station platforms with a common baseband unit, with RF modules using software-defined radios that support multiple standards (CDMA/EVDO, LTE and WiMAX) and services in a single rack and cabinet with improved coverage and performance, lower power consumption and operating cost compared to legacy single-mode base stations.
- **Remote radio heads:** directly connected to antennas on existing towers to decrease signal loss and increase coverage, reducing ground space requirements and power consumption.
- **Packet Backhaul:** highly scalable, Ethernet and IP network leveraging both microwave and fiber optic technologies.
- **Packet Core:** All-IP CDMA core and Evolved Packet Core for 4G, and related service platforms.
- **Advanced CDMA Technologies:** Support for 1x Advanced, enhanced mobile voice and data over current 3G network to allow the iDEN network to be retired while continuing to provide its industry's leading "gold standard" push-to-talk services over CDMA.

Sprint will phase the implementation of the move to multi-mode base stations over a 3 to 5 year period, beginning with 8-10 major markets in 2011, another 30 in 2012 and most of the remainder in 2013. Sprint plans to make an incremental investment of \$4-5 billion to implement this program over the 3-5 year period, and this should yield \$10 - \$11 billion in CAPEX and OPEX savings over a seven-year period. These financial benefits are the result of reductions in future capital and operating expenses as Sprint experiences continued growth in subscribers and mobile broadband usage data traffic.

Exhibit 2 summarizes Heavy Reading's assessment of the benefits and risks associated with Sprint's Network Vision programs and initiatives to be implemented over a 3-5 year period beginning in 2011.

Exhibit 2: Benefits and Challenges for Sprint's *Network Vision Initiative*

Source: Heavy Reading and Company Announcements

Network Vision Initiatives	Operating Risks and Benefits	Business Customer Benefits and Risks	Financial Benefits and Challenges
CDMA Network Evolution/Expansion	Reduced roaming lowers cost and fewer dropped calls	Enhanced 3G voice and data coverage/capacity, support for 1x Advanced	New equipment will reduce opex, lower power consumption
iDEN Network Migration/Retirement PTT over CDMA	Potential increase in call setup latency & coverage limitations	Need to maintain gold standard PTT services, features & performance	Need to integrate PTT features with new mobile devices
Multi-Mode Base Station Convergence	Increased flexibility in spectrum usage	Expanded 4G Network and Technology Options	Reduction in cell sites and operating costs
Ethernet Backhaul Microwave/Fiber	Highly Scalable Backhaul Capacity	Enhanced Network Capacity & Performance	Reduced cost of mobile Internet traffic
Packet Core and Service Platforms	Common converged packet core for 3G/ 4G mobile broadband	Dynamic policy control and end-to-end IP service management	Increase mobile broadband revenues and profitability

Sprint will need to carefully plan and execute the phased decommissioning of the legacy Nextel iDEN network and migration of its PTT customers to CDMA as it reduces cell sites and optimizes the future use of its spectrum holdings in the 800 MHz band. Sprint faced significant challenges in its previous attempt to migrate Nextel Direct Connect push-to-talk services to CDMA. Before migrating its iDEN customers this time, Sprint must now ensure service parity with low latency and group calling features on an expanded range of devices and a smooth transition. The benefits of the next generation PTT services will need to be clearly communicated to large and small business customers. Sprint also plans to use some of the liberated 800 MHz spectrum to enhance its CDMA voice services, implement CDMA 1X Advanced and gain significant flexibility in deploying new 4G technologies in the future such as LTE.




Network Vision Vendor Selection

As depicted on Exhibit 3, Sprint has selected three leading suppliers of converged wireless RAN technology and mobile network solutions for this major project to be implemented over the next 3-5 years. After a lengthy and thorough RFP response, proposal evaluation, short-list selection and budget review process, Sprint entered into a reverse auction and negotiation with the three finalists to ensure a financially attractive arrangement. It has now executed five-year contracts to partner with the three wireless technology leaders - Alcatel-Lucent, Ericsson and Samsung - roughly allocating one third of the project to each both by region and functional contribution. Each of the vendors selected as Network Vision partners already have a strong business relationship with Sprint and a current role in its network infrastructure. In the case of Alcatel-Lucent, this is via the merger with Lucent Technologies that originally deployed nearly half of Sprint's existing CDMA network, and the Franco-American company will now provide IP backhaul and multi-standard base stations supporting both 3G and 4G in multiple spectrum bands for Sprint's northeast, mid-Atlantic and Southern California markets.

Ericsson recently acquired Nortel's CDMA business unit that initially deployed nearly half of Sprint's existing CDMA network. Ericsson has recently completed the first year of a 7-year *Network Advantage* program under which it is responsible for the day-to-day services, provisioning and maintenance for the Sprint CDMA, iDEN and wireline networks. This role will continue and likely expand under Network Vision in which Ericsson will also be a major supplier of multi-standard radio base stations, packet core and backhaul networks for several southeast and south central markets.

Exhibit 3: Vendors Selected for Sprint Network Vision Initiative

Source: Heavy Reading and Company Announcements

Vendor			
Current Role with Sprint	Lucent Technologies originally deployed nearly half of Sprint's CDMA network	Acquired Nortel which deployed nearly half of Sprint's CDMA network	WiMAX base stations for Clearwire 4G network Epic 4G™ Smartphones
Converged RAN	Multi-standard base station solution supports both 3G and 4G in multiple spectrum bands	Multi-standard radio base station solution supports both 3G and 4G in multiple spectrum bands	Multi-mode base station supports 800 MHz and 1900 MHz bands and continued support for Clearwire Mobile WiMAX build-out
Regions/Cities (each was awarded roughly one third of the program)	Northeast, mid-Atlantic and Southern California markets such as New York City, Boston, Philadelphia, Washington/Baltimore, Los Angeles and San Diego	Southeast and south central markets including Atlanta, Miami, Houston, Kansas City and Dallas	Mid-west and northwest markets including Chicago, Denver, Pittsburgh, San Francisco, and Seattle
Backhaul and Transport	Single converged fiber and microwave IP backhaul Microwave Packet Radio Service Aggregation Router (Service Router (SR))	Ericsson MINI-LINK and SmartEdge End to End backhaul	
Packet Core		CDMA All-IP core network elements to support 1x Advanced Evolved Packet Core with MME and Converged Packet Gateway	
Services	Comprehensive turnkey network integration services	Complete turnkey network design, deployment integration & optimization services	Turnkey network design and deployment services provided by general contractors
Other	9900 Wireless Network Guardian (WNG) optimizes network performance	Network Advantage 7-year network service agreement nationwide	Samsung Galaxy S™ smartphone portfolio

Samsung is one of the major suppliers of Clearwire's WiMAX base stations and the Galaxy Epic 4G smartphone sold by Sprint, but is less known for its 3G infrastructure equipment. Sprint has executed a comparable 5-year agreement with Samsung Mobile to deploy next-generation multi-mode base stations in key mid-west and northwest markets as part of its Network Vision initiative. Unlike Ericsson and Alcatel-Lucent that have in-house network integration capabilities in the US, Samsung will rely on carefully selected general contractors for its turnkey network design and deployment services. Samsung Mobile's network infrastructure unit currently supplies the eNodeBs for the MetroPCS and Cellular South LTE networks commercially launched over the past few months.

Both Ericsson and Alcatel-Lucent have been busy deploying the eNodeB radio base stations for the Verizon LTE network that was commercially launched in early December, but these are pure overlay units rather than the multimodal base stations planned for the Sprint Network Vision program. These world class suppliers recognize the significance of being selected to implement Sprint's Network Vision initiative to create the industry's first multi-mode mobile broadband network. They are each contributing their unique technology and services to converge and future-proof the Sprint networks and deliver the benefits of the resulting leading-edge services to business and consumer customers. They also share Sprint's commitment to a sound business case and return on investment for this program,

estimated to be in the range of \$4-5 billion over 3-5 years. Having participated in the post-RFP reverse auction, these vendors now have the responsibility for comprehensive turnkey network design, deployment integration and optimization services on a highly cost-effective basis.

Mobile Device Evolution

Mobile operators already are seeing smartphone penetration growing so fast that is expected to double over the next 4 years, with markets such as the US leading the way with 60% smartphone market penetration by 2015. With 180 million sold in 2009, Pyramid Research projects 3G and 4G smartphone sales to increase 46% in 2010 and smartphones are projected to account for 53% of total mobile handset sales worldwide by 2015. The growth of powerful smartphone mobile devices along with connected notebook and tablet computers is driving new user behavior to stay connected at all times, and data traffic on many mobile networks is already doubling each year. As smartphones and data-intensive tablets continue to drive huge spikes in user adoption, sub-par 3G networks are no longer sufficient to handle the massive increase in mobile data traffic.



In the last few months alone, we have seen the HTC EVO 4G, Samsung Galaxy 4G, Apple iPad, RIM Blackberry Torch, Motorola Droid X and MyTouch 4G appear on the market, and the first LTE smartphones are only a few weeks away from commercial availability. Although the Apple iPhone and RIM Blackberry remain the market share leaders in smartphone operating systems, Google's Android has emerged as the fastest growing user community with its market share growing to 23% in 2010. With faster processors, larger touch screens, more advanced cameras, multimedia capabilities and higher-speed network connections, advanced smartphones are being used to attract and secure high-ARPU mobile broadband subscribers. In its most recent quarterly earnings call Sprint reported that over 60% of its new subscriber additions were from smartphone sales and close to two million new 4G mobile broadband subscribers were added with its new HTC EVO 4G and the Samsung Epic 4G smartphones.

In 2011, we expect every major vendor to introduce 4G smartphones, including Apple, RIM, Samsung, Motorola, Nokia and LG. In the near term, these advanced smartphones will need to integrate multiple 3G and 4G standards and spectrum bands to allow mobile operators to provide nationwide coverage for high speed mobile broadband data and voice services. In the context of this smartphone revolution, we expect that the unique push-to-talk voice features of Sprint's Direct Connect mobile phones should be mainstreamed to a wider range of feature and smartphone devices, ultimately supporting advanced 4G data and multimedia capabilities. Along with these new devices, the increased usage of multimedia media content and applications will continue to stretch the limits of today's mobile networks driving operators to make large radio access network and backhaul investments.



2. Benchmarking Against Key Service Categories

Heavy Reading has assessed the impact of the *Network Vision* initiative on Sprint's ability to achieve parity or enhance the coverage, capacity and performance of each major category of mobile service offerings.

- **3G CDMA:** The coverage, quality and capacity of CDMA mobile voice and data services should be significantly enhanced by the move to new multi-mode base stations.
- **CDMA 1X Advanced:** By implementing CDMA 1X Advanced Sprint can increase the spectrum efficiency of its CDMA 1X RTT network, improving voice coverage and capacity while enhancing mobile data performance and free up spectrum to expand EVDO mobile broadband data services.
- **PTT over CDMA:** Sprint plans to leverage advancements in Qualcomm's high-performance, IP-based QChat platform in order to launch the next-generation of push-to-talk services on the CDMA network beginning in 2011. Sprint must ensure service parity with low sub-second call set-up latency over both EVDO and 1XRTT and group calling features on an expanded range of devices while deploying next-generation PTT with broadband capabilities.
- **iDEN Network Plans:** Sprint should continue its relationship with Motorola Solutions to ensure software and hardware maintenance over the next two years, while carefully planning and executing the phased decommissioning of the legacy Nextel iDEN network and migration of its PTT customers to CDMA beginning in 2013. During the implementation of Network Vision, Sprint's PTT customers must continue to enjoy a superior customer experience on the iDEN network, as next generation push-to-data services are introduced.
- **Re-purpose 800 MHz spectrum:** As it reduces cell sites and optimizes the future use of its spectrum holdings, Sprint will also gain the opportunity to re-allocate of some portion of its current 800 MHz spectrum to enhance its CDMA voice services, resulting in better in-building penetration as well as reduced roaming and dropped calls from frequent call hand-offs. This should also allow Sprint to gain significant flexibility in deploying new 4G technologies.
- **3G EV-DO Mobile Broadband:** With the move to next generation multi-mode base stations, the coverage, capacity and performance of Sprint's primary 3G EVDO mobile data services should be significantly enhanced.
- **4G - WiMAX and LTE:** The Network Vision plan provides the flexibility to enhance the coverage of Sprint 4G services by extending the reach of the Clearwire WiMAX network using its new multi-mode base stations at a significantly lower cost than the current overlay strategy. Clearwire and Sprint are starting to address Clearwire's near term capital needs with the recently announced debt offering, which could also have an impact on Clearwire's equity ownership structure. Regardless of the outcome of this process, the Network Vision program will allow Sprint and/or Clearwire to more cost-effectively introduce other 4G services (LTE or LTE Advanced) using the extensive portfolio of 2.5 GHz and 800MHz spectrum.
- **Advanced Multimedia Applications:** The implementation of expanded Ethernet backhaul and IP packet core under the Network Vision program will provide a strong platform for the continued expansion of Sprint's multimedia applications portfolio. The new monitoring, policy management and data traffic optimization tools should also enhance Sprint's ability to deliver a better customer experience with multimedia applications and monetize the resulting services. The integration of multimode chipsets into a wide range of smartphones, tablets and other broadband devices will support the expansion of advanced multimedia applications and cost-effectively enhance Sprint's machine-to-machine (M2M) service capabilities.

3. Benchmarking Against Customer Segment Needs

Heavy Reading has summarized the implications of the Network Vision initiative on each of Sprint's key customer market segments on Exhibit 4. In order to achieve the full strategic benefit from this program, Sprint will need to ensure that it is customer-driven and balanced in addressing the current and future needs of its major customer segments. Network Vision will not succeed if it is limited to network modernization, operating efficiencies and cost savings for Sprint. Sprint's Network Vision plan must set a new industry benchmark for customer-driven mobile network evolution in the 4G decade ahead. Sprint must ensure that a positive customer experience is maintained and enhanced throughout the network modernization process, and the new converged network serves as a platform to meet evolving customer needs throughout the coming decade.

The US mobile industry has become focused on service demand from only the most technologically advanced consumers that have set the pace as early adopters of smartphones and mobile broadband services. By lowering the price threshold for mobile data services, Sprint should expand the low-end of its consumer market. Sprint has attracted these consumers by offering attractive advanced smartphones, maintaining unlimited mobile broadband usage and resisting the move to impose usage caps. With Network Vision, Sprint can accelerate these consumer market initiatives by delivering better metro-area and in-building coverage for both 3G and 4G services, adding PTT features to consumer smartphones and expanding the portfolio of 4G smartphones to include new connected tablets.

We believe enterprise customers should be the first to experience the benefits of Sprint's mobile network transformation, based on the enhanced coverage for 2G voice, 3G voice and data services; expanded 4G technology options and retooling of the industry's leading push-to-talk services to ensure low latency and group calling features on an expanded range of devices. Sprint needs to reach out to the largest enterprise iDEN network users with commitments to address their need for extensive wide area and in-building coverage, low latency call set-up, enhanced group calling features and new push-to-data capabilities as the iDEN network is retired. Large enterprise should also be the first to leverage new 4G devices and service options resulting from the Network Vision transformation. Sprint's Network Vision program should also deliver specific service and application benefits targeting both small and medium business customers, government and public safety, as well other new markets that are emerging as mobile broadband features are embedded in a wide range of consumer electronics, automotive and energy-related technologies.

Exhibit 4: Driving Customer Benefits from Sprint's Network Vision by Market Segment

Source: Heavy Reading

<p>Consumers</p> <ul style="list-style-type: none"> • Lower entry price threshold for mobile data • Consumer PTT and PTX on new smartphones • Better metro and in-building 2G/3G coverage • Enhanced 3G voice and data services • Continue unlimited mobile broadband usage • Expanded 4G device portfolio including tablets 	<p>Enterprise</p> <ul style="list-style-type: none"> • Enhanced coverage and quality for 2G voice • Enhanced 3G voice and data services • Extend 4G technology options to include LTE • Low latency & group calling features on PTT • Low cost for 3G/4G mobile broadband usage • PTT Features in broader range of devices
<p>Small/Medium Business</p> <ul style="list-style-type: none"> • Smooth transition to PTT on CDMA for SMBs • Ensure feature and performance parity for PTT • Develop packages for blending personal/work • Specific customer retention programs for SMBs • Extend business benefits to SMB employees • Expand PTT handset and embedded netbook/tablet portfolio for SMB users 	<p>Ecosystem Partners</p> <ul style="list-style-type: none"> • Low cost for embedded mobile broadband • Expand government/public safety ecosystem • M2M partnerships with industry leaders • Specific initiative to target SmartGrid market • Automotive communications and media • Expand wholesale options for data MVNOs

4. Benchmarking Network Vision Against Key Financial Objectives

Heavy Reading used the Wireless 20/20 WiROI 4G financial model to assess Sprint's Network Vision initiative against the financial objectives stated in the program. We drew on the limited financial data offered by Sprint in conjunction with this announcement as inputs into the WiROI 4G Model, to initiate a process of setting financial benchmarks for measuring the success of this initiative over a ten-year period. The results of this preliminary analysis are summarized in a series of graphical exhibits.

The capital investment plan announced for the Network Vision initiative is depicted in the blue bars on Exhibit 4, in which Sprint is investing \$4-5 Billion in incremental capital to deploy its new network infrastructure over the first three years of the project. This includes all elements of the project included in agreements with Alcatel-Lucent, Ericsson and Samsung, including multi-modal base stations, backhaul, packet core, software and services. As a result of this investment, future capital required for mobile network expansion beginning in 2014 is minimized, compared to the required capital investment to continue propagating three separate networks. The resulting network efficiency should allow Sprint to achieve the lowest per-unit cost of service among its primary competitors and provide the means to sustain the inevitable economic restructuring that will result from the transition from voice-centric 3G to IP-centric 4G mobile broadband networks as data service demand continues to increase. This demonstrates the efficiencies cost resulting from the upfront investment in next generation wireless technologies as wireless data traffic continues to grow.

Exhibit 5: Sprint Network Vision Incremental Capital Investment (in \$Billions)

Source: Wireless 20/20 – WiROI 4G Business Case Tool and Sprint Data

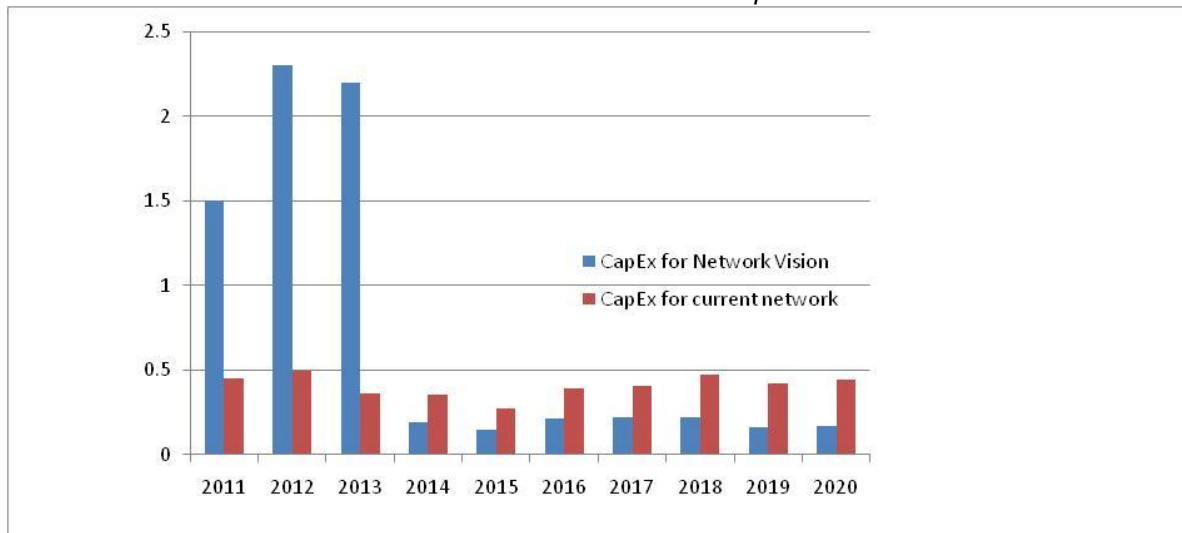
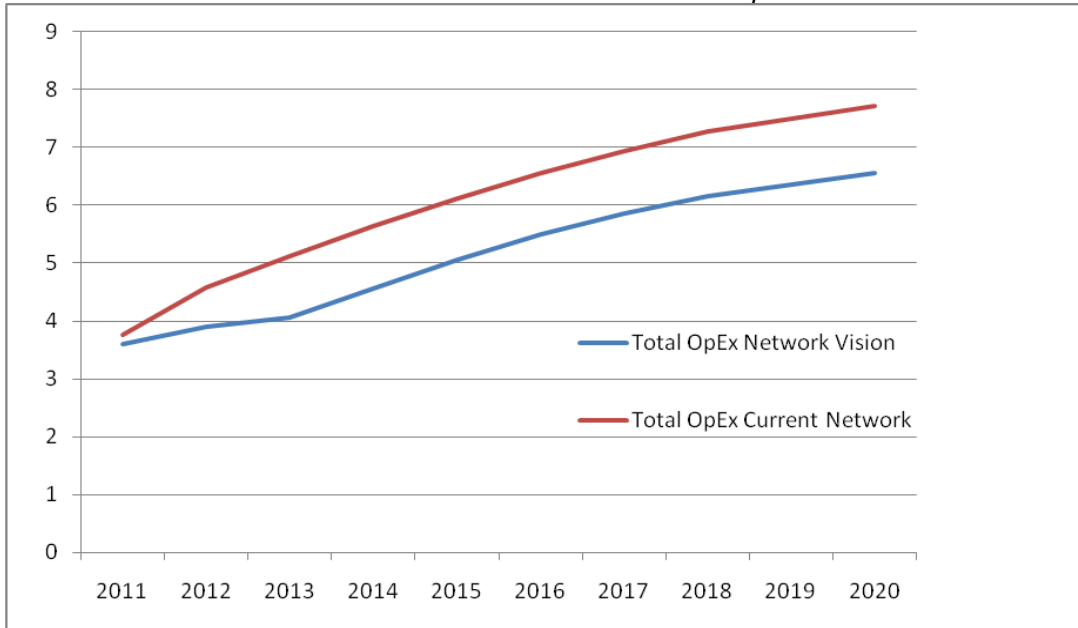


Exhibit 5 presents our estimates of the network operating expense savings that could be experienced by Sprint over the same 10-year period as a result of the Network Vision program. Our preliminary analysis indicates that Sprint could save approximately \$1 billion per year in network operating expenses beginning in 2013 as it realizes the benefits of the Network Vision initiative. These savings are a direct result of investing \$4-5 billion for the network convergence and modernization program through which Sprint will reduce the number of discrete cell sites and base stations while dramatically expanding the coverage and capacity for its 3G and 4G services. As a result, we believe that Sprint may be able to realize a savings of more than \$10 billion over the 10 year period. These savings will result from operating cost reductions in site and tower leases, equipment maintenance, energy consumption, backhaul circuits and roaming charges. Sprint has estimated the total net financial benefit to be between \$10 billion and \$11 billion over a seven-year period. Our analysis accounts for \$10 billion in OPEX savings and almost \$2 billion in CAPEX efficiencies over 10 years and does not account for potential savings on roaming charges. Based on these conclusions, our analysis appears to be in line with Sprint's estimates.

Exhibit 6: Sprint Network Vision Opex Savings Over Ten Years (in \$Billions)

Source: Wireless 20/20 – WiROI 4G Business Case Tool and Sprint Data



Sprint has placed greater emphasis on the energy efficiency and environmental sustainability benefits that are likely to result from the Network Vision initiative. Some of this will result from the reduced power consumption of new next generation base station equipment at each remaining cell site, and this is magnified by the plan to decommission a large number of energy inefficient legacy iDEN base stations. In addition to the operating cost savings which has been captured in the analysis, we agree that this network transformation will enhance the overall environmental sustainability of Sprint’s mobile network. We have not tried to capture these intangible benefits in this preliminary financial analysis.

Sprint’s stated financial strategy for Network Vision is based on a business case in which an incremental \$4-5 billion investment over 3-5 years should yield \$10 - \$11 billion in projected CAPEX and OPEX savings over a 7 year period. Sprint expects the Network Vision plan to bring financial benefits, not only by reducing operating costs, but also by reducing future capital requirements. Our business case simulation takes this analysis one step further by trying to account for the capital efficiency that can result from the upfront investment in next generation wireless technologies. These benefits are summarized in Exhibit 6, which shows that the reduced capital requirements in later years could reduce the net incremental capital investment of the Network Vision program to \$3.3 billion over a ten year period. We believe this could yield an additional cost savings from network operating expenses of \$9.6 billion over the ten year period. A more thorough business case analysis could yield an NPV and IRR calculation associated with this preliminary financial assessment.

Exhibit 7: Financial Benefits of Sprint’s Network Vision Initiative (in \$Billions)

Source: Wireless 20/20 and Heavy Reading

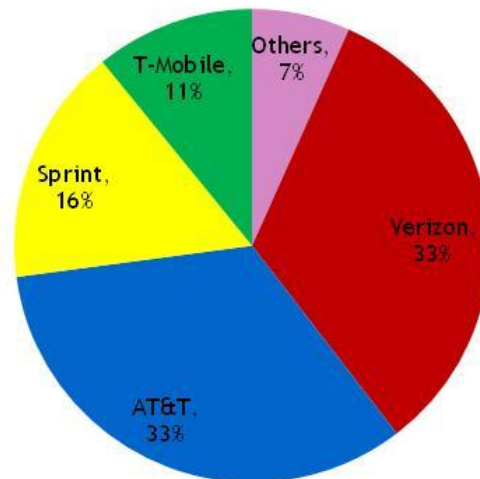
	Total 10 Year CAPEX	Total 10 Year OPEX
Current network configuration	\$4.0	\$61.2
Network Vision Plan	\$7.3	\$51.6
Net Incremental Investment and Resulting OPEX Savings over 10 years	\$3.3	\$9.6

5. Benchmarking Against Key Competitors

The leading mobile operators in the highly competitive US market are each actively acquiring new spectrum and investing in mobile broadband network technologies in an effort to keep pace with competitors, subscriber demand and device innovation. Several recent mergers and acquisitions have contributed to another round of industry consolidation, and Exhibit 8 demonstrates that the top four providers now control more than 90% of mobile subscribers including retail and wholesale MVNOs. With overall subscriber growth slowing, operators are now leveraging advanced smartphone devices and related mobile broadband services to gain market share and increase average revenue per user (ARPU), while trying to keep pace with the resulting explosion in mobile data traffic growth.

Exhibit 8: US Mobile Operator Market Share Yearend 2010 (estimate)

Source: Pyramid Research -- US Mobile Operators Forecasts Q3 2010







The network evolution plans of four leading US mobile operators are summarized on Exhibit 9. Each of these operators is trying to be a first mover in providing its customers mobile broadband user experience, but with different technology choices based on their current network technology and spectrum position. US mobile operators have been driven by competition to invest in multiple networks platforms, maintaining their legacy infrastructure while deploying new IP-based mobile broadband networks. Nonetheless, each of the leading US mobile operators is moving toward a 4G network and are carefully planning how to optimize coverage and capacity within their given spectrum allocations and network platforms.

- LTE overlaid on EVDO Rev. A as the Verizon Wireless 4G mobile broadband network
- HSPA+ mobile broadband for AT&T and T-Mobile and a key interim step to 4G LTE
- Mobile WiMAX overlaid on EVDO Rev. A to enhance Sprint's mobile broadband network

For example, the LTE network being launched commercially by Verizon Wireless has been deployed as an "overlay" of eNodeB radio base stations on its existing native CDMA network, using many existing cell sites and backhaul infrastructure. The mobile industry is now at a tipping point where this network overlay strategy may no longer be sustainable, as the deployment and maintenance of multiple networks drives up both capital and operating expenses. These wireless network infrastructure overlays also create complexity in radio access and backhaul networks, service platforms and ultimately the protocols and frequency bands that must be supported in end user mobile devices.

Exhibit 9: Network Roadmaps for Major Mobile Network Operators

Source: Heavy Reading

				
2G	CDMA 1xRTT iDEN PTT	CDMA 1xRTT	GSM Edge	GSM Edge
3G	EVDO Rev. A	EVDO Rev. A	HSPA+ 14.4	UMTS
4G	Clearwire 802.16e Mobile WiMAX	LTE FDD	HSPA+ 21 LTE FDD	HSPA+ 21
4G IMT Advanced Multi-Standard	Network Vision LTE Advanced	LTE Advanced	LTE Advanced	?

Each of the US mobile operators will soon be trying to leverage available radio access technology options in the face of heightened competition to fine tune their 4G network strategies and technology roadmaps, especially as new options are being introduced in 2011, such as:

- Enhanced HSPA+ offering 42 Mbps downlinks for operators with sufficient 3G spectrum
- Multi-mode base stations and integrated device chipsets supporting both 3G and 4G services
- LTE-TDD as an alternate path to 4G for WiMAX operators with 2.3 or 2.5 GHz TDD spectrum
- 3GPP harmonization of LTE FDD and LTE TDD for true 4G under LTE-Advanced

Sprint's Network Vision project is a major innovation and leap forward since it will support multiple air interfaces and radio frequencies using one multi-modal base station platform at a cell site. This will allow Sprint to expand its CDMA/EVDO network coverage and could allow for the cost-effective introduction of LTE to complement its current WiMAX 4G services in the future. With the announcement of world class vendors for this project, Sprint is the first major mobile operator to commit to a single multi-standard, converged mobile network to strengthen its 3G voice and data services; expand 4G technology options, while continuing to provide the industry's leading push-to-talk services. Sprint currently relies on Clearwire's ownership of 120 MHz of 2.5 GHz spectrum per market as the key to maintaining its leadership position in 4G services. While Clearwire has been aggressively deploying high capacity microwave Ethernet backhaul to its WiMAX base stations, Sprint is implementing a flat IP packet core located at the network edge that supports multiple RAN technologies as well as rapid application and device innovation. We believe the Network Vision initiative provides a foundation for Sprint to also be the first US operator to meet the new standard for 4G IMT Advanced recently set by the ITU.

Sprint's move from multiple networks to one network will take three to four years to complete. As indicated in Exhibit 10, Sprint currently supports 38,000 CDMA cell sites and 30,000 iDEN cell sites for a total of 68,000 sites, and has co-located CDMA and iDEN base stations in only 8,000 locations. By implementing the Network Vision plan, Sprint would be able to decommission 22,000 sites which exclusively support the legacy iDEN network. Sprint currently maintains approximately 60,000 cell site locations with 68,000 total base stations at those locations, and plans to reduce this to 50-57,000 sites with multimode base stations under the Network Vision plan.

Exhibit 10: US Mobile Operator Total Cell Sites

Source: Heavy Reading Estimates Based on Company Data

	2010	2013
Verizon Wireless	43,500	?
AT&T	54,000	?
T-Mobile USA	49,000	?
Sprint CDMA	38,000	50-57,000 sites Each with one multimode base station
Sprint iDEN	30,000	
Clearwire	14,500	

Verizon Wireless continues to grow its mobile broadband market share in part through aggressive marketing of new EVDO smartphones, including the Droid X. Having completed the integration and upgrade of the Alltel wireless network acquired in 2009, Verizon Wireless currently supports some 43,500 cell sites and invests approximately \$8 billion annually to maintain and expand its nationwide 2G CDMA voice and 3G EVDO data networks. Verizon Wireless launched its new 4G LTE services in December 2010, with initial availability in 38 major US markets covering approximately 110M POPs along with 60 airports. The new Verizon Wireless LTE network using 700 MHz spectrum has been deployed as an "overlay" to its existing native CDMA network, using many existing cell sites and backhaul infrastructure. It must co-exist and integrate with its existing CDMA and EVDO RevA networks in order to provide seamless nationwide coverage for all Verizon Wireless subscribers. Verizon's LTE network benefits from a highly scalable 10 gigabit Ethernet over SONET backhaul network with significant use of fiber complemented by microwave links. Verizon has also deployed an enhanced packet core and IMS platform to allow 4G devices to work on 3G and create a consistent applications experience across networks.

Based on extensive field tests in Boston and Seattle, Verizon Wireless predicts its LTE network will provide a 10X increase in mobile broadband capacity over its EVDO network. Only one USB dongle and embedded notebooks are available at launch, and Verizon Wireless expects to have a growing portfolio of LTE smartphones starting in Q1 2011. The service will cost subscribers \$50 per month for 5 GB or \$80 per month for 10 GB of data transfer, compared to Sprint and Clearwire which offer unlimited 4G access at slightly lower speeds for \$55 a month, with no usage limits. Verizon Wireless plans to extend the LTE overlay network to provide coverage of 200M Pops in 2012, and 285M+ Pops to match its current 3G footprint when the network is completed in 2013. Verizon Wireless will fully leverage the use of its nationwide contiguous 700 MHz spectrum to achieve extensive wide area and in-building LTE coverage. Verizon Wireless is also working with rural wireless operators to use their towers along with its 800 MHz spectrum and equipment to extend the coverage of its LTE network to a broader customer base.

T-Mobile USA has been busy upgrading its HSPA+ network to 21 Mbps with IP-capable backhaul to offer true high-speed mobile broadband performance. T-Mobile USA has recently launched a major new ad campaign declaring its HSPA+ network to be "4G" today. With the introduction of HSPA+ in six additional metro areas including Chicago, the fourth largest US mobile operator is claiming to have "the nation's largest 4G network." As its HSPA+ network rollout reaches critical mass, T-Mobile USA is preparing the retail launch of the first wave of HSPA+ smartphones and an HSPA+ enabled netbook. T-Mobile USA claims that by the end of 2010 they will have two times the coverage of competitive LTE or WiMAX networks from Verizon Wireless and Sprint. The T-Mobile network currently consists of almost 50,000 cell sites covers over 293 million Pops, predominantly using GSM/GPRS 1900 MHz in the United States. T-Mobile has been rolling out AWS services (at 1700/2100 MHz) for their HSPA+ data, making it incompatible with other existing 3G UMTS/HSPA networks in the US.

T-Mobile USA is also charting out a path beyond its current 21 Mbps speeds, potentially all the way up to 168 Mbps in the future. It has enough AWS 1700 MHz spectrum for its current plans, and it can bond the AWS spectrum with 1900 MHz PCS spectrum to offer 42 Mbps in most of the carrier's cities. That requires double the spectrum of 21 Mbps, so it may need to buy additional spectrum in upcoming AWS auctions. In 2012, T-Mobile plans to upgrade its network to the 84 Mbps level of the HSPA+ standard, which uses MIMO antennas on handsets and base stations. Rather than laying out a road-map for LTE using new spectrum, T-Mobile is fully leveraging the global economies of scale of HSPA+ and anticipating the standardization of 168 Mbps and beyond.

AT&T has also been busy upgrading its 3G cell sites nationwide to HSPA and enhancing its back-haul, but until recently only claimed to be offering 3G+ mobile broadband services, initially at 7.2 and now at 14.4 Mbps. In fact, AT&T has been promoting the use of Wi-Fi to complement its 3G+ network, since it operates the largest nationwide network of more than 23,000 Wi-Fi hotspots. AT&T has activated millions of 3G iPhone 4 smartphones, and has restricted some of its most bandwidth intensive applications such as Apple's Facetime to Wi-Fi connectivity. Citing the rapid consumer adoption of Wi-Fi-enabled smartphones and the increasing availability of Wi-Fi access, AT&T reported 320 percent growth in Wi-Fi connections on its US Wi-Fi network in the third quarter of 2010. Although AT&T has been actively investing in expansion of its Wi-Fi coverage and 3G+ HSPA network capabilities, it has started to fall behind in the race to 4G.

AT&T has begun repositioning its network modernization program based on HSPA+ technology and started discussing plans for its first HSPA+ compatible devices. But in response to T-Mobile's latest flurry of 4G announcements and advertising, AT&T now claims to be deploying the same HSPA+ 21 technology as T-Mobile, but to more than T-Mobile's reported 140M Pops with an expansion to 250M Pops by yearend 2010. In an effort to keep pace with T-Mobile's claims, AT&T is now reporting that the use of 64 QAM modulation allows its network to perform faster than HSPA+ 14.4. With the renewed focus on HSPA+ technology upgrades, AT&T has taken the spotlight off their LTE trials and initial nationwide deployment slated for 2011. With the launch of Verizon's LTE service, we expect a renewed focus on AT&T's LTE network plans in early 2011, and AT&T will need to address whether LTE will be deployed as another network overlay or to migrate to a new fully integrated 3G/4G platform using new multi-mode base stations. With an estimated 54,000 cell sites, we expect AT&T to closely monitor Sprint's Network Vision initiative before announcing LTE deployment plans.

Overall Assessment of Sprint's Network Vision Initiative

Heavy Reading believes Sprint's Network Vision is a necessary, prudent and ambitious program that promises dramatic improvements in network coverage, capacity and performance for customers along with significant cost and economic benefits for the company and its shareholders. This blueprint for mobile network convergence will also allow the operator to optimize the future use of its vast spectrum holdings and set a path for reduced energy consumption and environmental sustainability.

As the first mobile operator committed to deploying new multi-mode base stations, Sprint has set a new industry benchmark for customer-driven mobile network evolution in the 4G decade ahead. Being first also carries some risks that will need to be carefully managed during the three year transition period. This is new technology, and project management and oversight are critical to ensuring that the three primary suppliers and other ecosystem partners properly execute this network modernization effort. There is also need to manage the economic risk of financing this major capital program and delivering the projected cost savings and return on investment.

But most important is maintaining a focus on enhancing the customer experience to minimize churn and elevate customer confidence and loyalty, both during and after the Network Vision deployment period. The success of this initiative will be measured by Sprint's ability to leverage the investment in next generation network technology to establish a platform for subscriber and profitable revenue growth over the next ten years.

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Berge Ayvazian is conducting research and consulting projects on the convergence of broadband and mobility and the business strategies of mobile broadband technology and service providers. He is also a frequent contributor to Light Reading and speaker at telecom industry events.

Ayvazian is now leading a new integrated research and consulting practice on 4G network and mobile Internet evolution. This practice helps global operators and their vendors develop a complete mobile Internet business case leveraging the WiROI planning tool and regional mobile Internet demand analysis from Pyramid Research, and plan their 4G technology roadmaps by building on Heavy Reading research in packet core, service platforms and mobile backhaul.

Developed in partnership with specialty consulting group Wireless 20/20, these 4G business planning and consulting services are designed to help 4G network operators address the challenge of planning their 4G wireless networks and developing a bankable business case essential to raising equity, debt and vendor financing.

Berge Ayvazian joined Heavy Reading as a Senior Consultant, following more than twenty years as a senior telecom industry analyst and strategy consultant with Yankee Group. He recently served as the co-chairman of Yankee Group's 4G World, WiMAX World and Mobile Internet World conference programs. Berge has served as Yankee Group's Chief Executive Officer from 1999 through 2001, and later served as strategy director for the Reuters Research and Advisory Unit.

Ayvazian graduated with a B.A. from Bucknell University and has an M.A. from the Annenberg School of Communications at the University of Pennsylvania. He now resides in Massachusetts and can be reached at ayvazian@heavyreading.com.

About Heavy Reading and Pyramid Research

As the research divisions of the Light Reading Communications Network, Heavy Reading and Pyramid Research provide the most comprehensive communications research, technology analysis, and market data for more than 100 markets around the world. Heavy Reading is recognized for its ability to clearly analyze complex networking and technology issues. Pyramid Research's analysis is positioned at the intersection of emerging markets, technologies, and business models, powered by the bottom-up methodology of its market forecasts. Founded in 2000, [Light Reading](http://www.lightreading.com) is the leading online media, research, and focused event company serving the \$3 trillion worldwide communications market. Light Reading was acquired by United Business Media in August 2005 and operates as a unit of UBM TechWeb. For more information, visit: www.lightreading.com, www.heavyreading.com, or www.pyr.com.

4G Business Plan Consulting Service

Heavy Reading (www.heavyreading.com) and Pyramid Research (www.pyr.com) have joined forces to offer custom research and consulting services for global operators and their vendors planning 4G wireless networks and mobile broadband services. These research units of the Light Reading Communications Network have teamed with Wireless 20/20 LLC (www.wireless2020.com), a specialty consulting group supporting the mobile broadband industry, to develop these 4G business planning and consulting services designed to help 4G network operators address the challenge of developing a bankable business case essential to raising equity, debt and vendor financing.

To learn more about the **4G Business Plan Consulting Service**, contact the author of this paper, Berge Ayvazian, at ayvazian@heavyreading.com