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# SercoNet Business Plan



**Business contact:**

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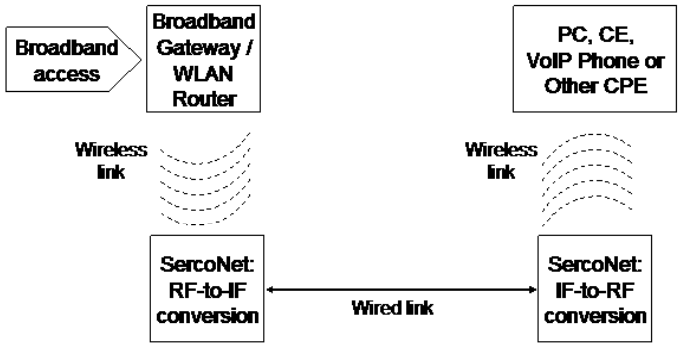
# EXECUTIVE SUMMARY

Residential broadband now serves more than 170 million homes[1] worldwide. In the US today, the number of homes served by broadband exceeds the number served by dialup. Initially driven by user demand for high-speed Internet access and email, broadband service is now increasingly valued by consumers for access to music downloads, interactive gaming and voice-over-IP (VoIP) telephone service. Early adopters are also beginning to explore video and other multimedia applications, which will soon join data, audio and gaming as mass-market drivers of demand for residential broadband services.

Global demand for broadband services has created a growing market for local area networking (LAN) in the home, in multiple dwelling units, hotels and other public locations. Initially used to share broadband access amongst multiple home computers—and later to permit home roaming by laptops that connect through a wireless LAN (WLAN)—home networks are now required to connect a variety of consumer devices to the residential broadband gateway, including VoIP telephones, audio and video systems, home security monitors and alarm systems, etc. In 2004, more than 36 million homes[2] worldwide had some type of home network; by 2008 25% of broadband homes will have VoIP access[3], and by 2009 more than 154 million network-enabled consumer electronics[4] (CE) products will be sold annually. Broadband is becoming the source of information, communication and entertainment in the home, and this requires broadband access in every room: the home office, the living room, the bedroom—even the garage (to Bluetooth those MP3s to the car audio system).



Convenience and low cost has firmly established WLAN, based on 802.11b/g standards, as the preferred home network technology. 802.11 (i.e. Wi-Fi™) often fails, however, to provide access throughout the home, especially in locations that are a moderate distance from the WLAN router, or in locations where walls or other physical barriers separate the WLAN router from the customer premise equipment (CPE) that seeks access to the network. Lack of coverage throughout a home is frustrating for the consumer--and frustrating for broadband, VoIP and other service providers, who must field subscribers calls and roll trucks to identify and




Wireless-to-Wired Hybrid Network

[1] Source: IDC, DSL Forum (2005 estimates)

[2] Source: IDC, Instat

[3] Source: Yankee Group

[4] Source: iSuppli

resolve access problems at subscriber locations.

SercoNet has developed a portfolio of technologies that enable the creation of low-cost, highly efficient hybrid home networks. Hybrid networks combine the convenience of wireless access within each room served, while extending coverage throughout the home with wired distribution between rooms., Hybrid networks create a reliable wired backbone for a wireless home network that are capable of providing consumers with data rates that support simultaneous "triple-play" (i.e. data, audio and video/multimedia) broadband applications at multiple locations.

The interface between the wired and wireless media is the critical function within a hybrid network. SercoNet's elegant hybrid network solution utilizes a frequency shifting circuit that converts the GHz radio frequency (RF) used by WLANs and other wireless transmission technologies, into a MHz intermediate frequency (IF) that is suited for transmission along any wired media. The SercoNet design also performs the reverse function—converting IF back to RF—thus providing wireless access in locations that are physically removed from the broadband gateway. SercoNet's proprietary technology has two distinguishing attributes:

- By shifting frequencies between RF and IF, the SercoNet architecture does not require modulation/demodulation or coding/decoding of the data stream at any point between the residential broadband gateway and the CPE node. The original wireless modulation encoding that is received by the first SercoNet device is preserved in its native state and transmitted over wired media to a second SercoNet device, then transmitted wirelessly at a remote location by the second SercoNet device. The SercoNet architecture offers considerable performance and cost benefits over competing wireless-to-wired hybrid networking interfaces, which require expensive and time-consuming demodulation and re-modulation as the data stream is trans-coded from wireless to wired media, and back again.
- SercoNet's frequency shifting technology is modulation agnostic—it can perform RF-to-IF, wireless-to-wired conversions on a wide range of wireless transmission standards, including 3G, EVDO and GPRS mobile telephone systems, and Bluetooth, UWB, Zigbee, WiMAX (802.16) and other data transmission standards. This enables SercoNet to address a wide range of hybrid network applications and markets in addition to the company's initial focus on the popular 802.11/Wi-Fi home networking market.



## KEY ACCOMPLISHMENTS TO-DATE

SercoNet was organized to address networking solutions in 2004. The company has 19 employees at its R&D center in Israel and HQ office in the US. To-date the company has achieved several significant corporate milestones:

- SercoNet has developed two generations of its standards-compliant, patented hybrid networking technology. The current 802.11 solution combines an off-the-shelf WLAN transceiver with discrete components to implement the company's unique frequency shifting architecture.
- The SercoNet design has been thoroughly beta-tested and validated as an effective hybrid network extension of 802.11 by WLAN OEMs, cable equipment OEMs, Telco service providers, and computer

OEMs.

- SercoNet has secured an extensive IP portfolio consisting of 13 issued and 20 pending patents. SercoNet IP covers core circuit and implementation architectures and techniques for a broad range of wireless-to-wired hybrid network technologies. The company is represented by a leading corporate law firm, which is aggressively pursuing enforcement of SercoNet patents.
- SercoNet has signed three letters-of-intent to license its current 802.11/Wi-Fi product design for commercial distribution: with a leading consumer electronics OEM, a leading WLAN OEM and a leading European DSL modem OEM. Product announcements are expected at CES 2006, and shipments are expected in 3Q06.

SercoNet offers a key enabling technology for the rapidly growing, multi-million unit global home networking market. The company seeks additional funding to continue cost redirection and high-volume distribution of its patented technologies. SercoNet plans to pursue a fables semiconductor business model and integrate its initial 802.11 product into a single IC to achieve significant bill-of-materials (BOM) cost savings and product proliferation; the company also plans to opportunistically expand its product line into additional market segments.



## MARKET ENVIRONMENT

The continuing rapid growth of residential broadband access worldwide is a well established consumer trend. Residential broadband subscribers, comprising both DSL and cable modem services, are expected to grow at a compounded annual unit growth rate of 13%, nearly doubling from 170 million subscribers in 2005 to 320 million subscribers in 2010[5]. Residential broadband is a global phenomenon: in 2005 22% of the world's broadband subscribers were in the US; 28% in Western Europe; and 37% in the Asian countries of China, Japan and South Korea[6].

Broadband has grown to its current subscriber base driven primarily by consumer demand for first generation data applications: email and Internet access. A second generation of audio- and image-based applications—music downloads and streaming, JPEG still image sharing, gaming and Internet telephony—are currently increasing the value that consumers derive from broadband access. As the broadband subscriber base continues to expand, a third generation of full-motion video and multimedia applications are expected to achieve critical mass, including streaming, high-definition and interactive video. Together, these three generations of Internet applications (data, audio/image and video/multimedia) constitute a 'triple-play' for broadband service providers—a trifecta of popular applications that members of the global middle-class will consider as fundamental to life in the 21st century as telephone, radio and broadcast television were in the 20th. Provision of triple-play service represents an unprecedented revenue opportunity for global service providers.

[5] Source IDC and SercoNet forecasts

[6] Source: DSL Forum

## NEW APPLICATIONS ACCELERATE GROWTH OF HOME NETWORKS

The proliferation of second and third generation Internet applications will increase both the number and kinds of devices that connect to the residential broadband gateway. Portable music players, VoIP telephones, stereos, televisions, DVDs, game boxes, set-top boxes, media servers and other CE devices are now joining computers as nodes on the broadband gateway network. Sharing broadband access amongst this growing list of Internet-connected CE devices—CE devices that are located throughout the home, not just in the home office—is driving rapid deployment of home networks, especially in the US and Europe.

By far the most popular and fastest growing type of home network implementation is the wireless network. Enabled by the ubiquitous adoption of 802.11b/g standards, and by the rapid reduction in silicon cost, WLAN routers can now be purchased at retail for less than US$50. Where wireless home networks encounter performance and access problems, wired networks that utilize existing power line, phone line or coaxial cable plant in the home have achieved a degree of market penetration. The most popular wired network implementations are based on the HomePlug™ 1.0 power line standard.

Wireless systems are clearly preferred by consumers for their superior convenience and bandwidth. WLANs eliminate wires within and between rooms, permit mobile access to networks by notebook computers and other mobile equipment, and offer data rates that are competitive and even superior to current wired networking solutions. Broadband service providers also prefer wireless networks because it reduces any need to run new cabling when installing new residential service. Consequently, wireless home networks currently outsell wired home networks by a factor of ten-to-one.



## WIRELESS COVERAGE LIMITATIONS DRIVE ALTERNATIVE SOLUTIONS

Although popular, WLANs have significant performance limitations. The 802.11g standard offers coverage only within a theoretical maximum radius of 300ft. (100m) from the WLAN access point (AP). In reality, coverage often extends no further than dozens of feet from the AP, especially if walls, ceilings, floors or other physical objects intervene between the CPE reception node and the WLAN AP. The exact range of a given WLAN AP is greatly, and dynamically, affected by its precise placement, the type of construction materials used in walls and floors (e.g. cement, wood frame, steel beam), the presence of other RF emission sources (e.g. microwaves) and other factors that are difficult for consumers or broadband service providers to either anticipate or control.

**"The advantages that wireless networks bring in terms of the flexibility that they give users in accessing broadband Internet connections from multiple locations in the home can often be offset by the fact that many users do not receive consistent and reliable coverage in all parts of their home."**

**--market research firm Parks Associates**

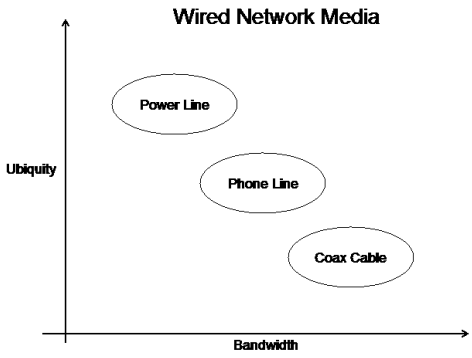
When WLANs were used primarily for computer access to the Internet, consumers could easily arrange to place the WLAN AP near their primary PC work location—typically in the home office. Now that consumers expect an increasing number of CE devices to access the network, the luxury of limiting access to one or a few rooms in the home is no longer viable. Cable service providers also require flexible solutions that enable coverage even when the subscriber desires access in only a single room because the desired location of service within a home may be at the opposite side of the structure from the cable drop attached to the nearest a public utility pole.

There are a number of wired and wireless technologies that overcome 802.11/Wi-Fi coverage limitations.

### *Wired Network Solutions to Extend Coverage*

Networks that utilize existing wires within the home offer the possibility of distributing broadband access wherever it is needed. Solutions have been proposed or deployed that utilize power line, phone line or coaxial cable distribution to achieve broader coverage than 802.11/Wi-Fi. The choice of wired media constitutes a trade-off of bandwidth vs. ubiquity: power lines are available in almost every room, but was originally designed for signals in the Hz range; phone lines are available in many rooms, but was originally designed for signals in the kHz range; and coax cable is available in few rooms (if at all), but is designed to carry signals in the MHz range.

Whatever wired media is chosen, a wired connection of some type must still be run from a network termination point within each room to the receiving CPE node. Wired network solutions may provide coverage throughout the home, but at a significant cost of diminished convenience and esthetic simplicity within each room. And no wired solutions are capable of supporting mobile applications, such as "cordless" VoIP telephone handsets.




Of all the wired network solutions deployed, HomePlug is by far the most advanced in market penetration. HomePlug 1.0 has been deployed in millions of homes (vs. tens of millions for Wi-Fi WLAN). With a maximum raw data rate of 14 Mbit/s, HomePlug 1.0 offers a fraction of the throughput of 802.11g, which supports a raw data rate of 54 Mbit/s. Furthermore, by utilizing a wired network medium where vacuum cleaners, microwave ovens, light dimmers and other noise inducing devices are network "nodes" (alongside gateway routers and CPEs), HomePlug is notoriously subject to interruption. With less bandwidth, greater susceptibility to interference, less convenience and the need to run wires from the power main to each CPE in a room, HomePlug has only penetrated those locations where Wi-Fi suffers profound coverage problems.



To address bandwidth limitations, the HomePlug consortium is proposing a next-generation HomePugAV specification, which claims raw data rates up to 200 Mbit/s. HomePlugAV will not, however, resolve the convenience, esthetic and noise problems that plague HomePlug 1.0.

Home networks based on phone line and coax distribution also have their champions and standards consortia: HomePNA is developing the HomePNA 3.0 standard for phone line distribution; and MoCA has developed standards for coax cabling. While both phone line and coax media were originally designed to support higher bandwidths than the power line, and while both phone line and coax do not suffer the negative effects of vacuum cleaner and dimmer switch network "nodes," neither HomePNA nor MoCA has achieved any real market penetration to-date. Coax-based solutions, such as MoCA, seem to be permanently at a disadvantage with limited termination points within the home, and a limited coax cable installed base within homes worldwide.

### *Wireless Network Solutions to Extend Coverage*

Wireless solutions to extend coverage throughout the home would preserve all the conveniences that make Wi-Fi so attractive to consumers in the first place. Wi-Fi repeaters have appeared in the market for users that require broadband access beyond the range of their primary WLAN AP. Repeaters receive an 802.11 signal from the primary AP and re-transmit it, extending the coverage area. Repeaters suffer from two important limitations, however. They require the primary AP and the repeater to be placed close enough together so that their coverage areas overlap, which may not be possible or practical in many deployments.

More importantly, repeaters—at best—cut the received data rate in half. Wi-Fi modulation, like HomePlug and other data networking schemes, includes packet overhead in its raw transmission rate of 54 Mbit/s. The maximum payload for 802.11g is approximately 50% of the raw data rate. Since a repeater must decode the signal from the primary AP, then recode and re-transmit it, the receiving CPE node receives a maximum of 25% (50% of 50%) of the primary raw data rate. And this received data rate falls by half for each "hop" in a repeater network.

Another perceived solution to current Wi-Fi coverage limitations are new 802.11variants: "super-g" and 802.11n (i.e. MIMO). Both super-g and 802.11n promise higher data rates (greater than 100Mbit/s) than the existing 802.11b/g standard. These higher data rates are achieved through the use of an arrayed antenna technology that requires multiple transmitters per AP (at a concomitant higher unit cost). At whatever cost, these extensions of 802.11 are primarily designed to increase bandwidth at locations that are already capable of receiving 802.11b/g signals. Super-g and 802.11n do not extend the coverage area where broadband access is lost due to normal attenuation of wireless signals.



## HYBRID NETWORK OPPORTUNITY

Hybrid networks, which combine wired backbones for house-wide signal distribution with the convenience of wireless APs in each room served, offer consumers and service providers the most effective and satisfying solution to whole-house network coverage. Hybrid networks can be built using any one of the three existing residential wired plant (power, phone or coax), utilizing market leading 802.11/Wi-Fi APs in every room or location that requires broadband service.

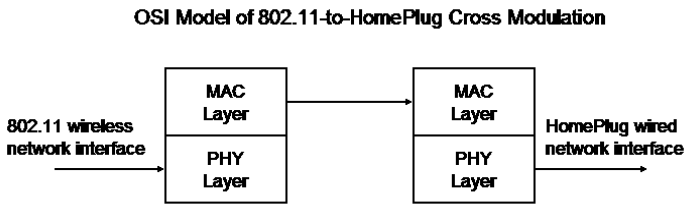
**"The promise of hybrid networks are solutions that offer end-users a great deal of flexibility and performance … for service providers and OEM players, hybrids will deliver more reliability and fewer customer service calls, which have a significant impact on customer satisfaction and brand loyalty."**

**--Parks Associates**

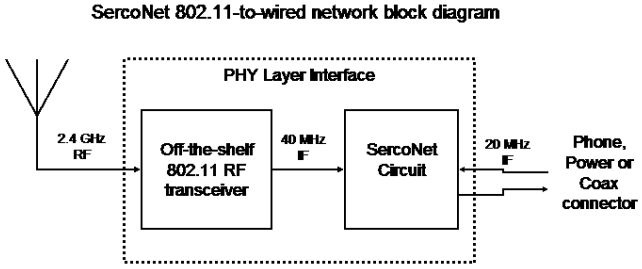
With a superior combination of coverage and convenience, hybrid networks will be the primary means of delivering broadband applications to consumers globally in the next five years. Based on current and projected global penetration rates for broadband access and home networking, consumer demand for hybrid home networks should exceed 80 million units annually by 2010.

# SERCONET SOLUTION FOR HYBRID NETWORKS

While hybrid networks offer consumers a superior combination of convenience and coverage, current hybrid implementations are complex and expensive. Distinct modulation codes exist for wired and wireless transmission, requiring cross-modulation (i.e. trans-coding) at the MAC layer interface between wired and wireless sections of a hybrid network. For instance, combining 802.11 and HomePlug to create a complete hybrid network interface currently requires separate DSP-based processors to perform both modulation schemes, with the interface between modulation codes occurring at the MAC layer. This demodulation and re-modulation introduces significant expense and transmission delay into the hybrid network.




SercoNet's unique, patented technology for hybrid networks relies on the fact that wireless modulation techniques are typically more robust and reliable than wired modulation techniques. The SercoNet architecture simply shifts the frequency of the wireless signal from the RF range to an IF range that is suitable for wired transmission, and transmits the wireless modulation coding (e.g. 802.11) unchanged through the wired portion of the network. Signals from the wired network are similarly shifted back from IF to RF frequencies for broadcast using standard wireless channels.






The entire SercoNet interface operates at the PHY layer without any need for cross-modulation, resulting in significant cost savings and minimal latency. It is completely compliant with, and in fact transparent to, the underlying 802.11 standard. SercoNet hybrid systems can be easily self-deployed by consumers—there is no software to download or install, nothing to configure.

### *Key Technology Can Be Broadly Applied*

**The SercoNet frequency shifting technique can be applied to any type of wired media: power line, phone line or coax. And the technique can be easily adapted to a wide array of wireless modulation codes: 802.11/Wi-Fi, Bluetooth, Zigbee, UWB, CDMA, EDGE, GSM and 802.16, among others**.

In addition to its immediate application in extending 802.11/Wi-Fi coverage throughout a structure, SercoNet's powerful hybrid network architecture can be applied to many market segments and applications, for instance, to distribute mobile telephone and WiMAX metro network access inside buildings where reception is otherwise unavailable.

### THIRD-PARTY BETA TESTING CONFIRMS PERFORMANCE

SercoNet has developed board level implementations of an 802.11-to-phone line design using an off-the-shelf 802.11g transceiver and discrete components, targeted at Wi-Fi hybrid network applications. This board level implementation is suitable for immediate deployment in cost-insensitive market segments. The company selected phone line as the wired medium for its first product because it represents the best trade off of between ubiquity, bandwidth and noise immunity. SercoNet's reference design utilizes the upper portion of the phone line frequency spectrum; it does not interfere with POTS or DSL service on the same line.

SercoNet's reference design has undergone extensive third-party beta/field testing, which confirms SercoNet expectations for improving Wi-Fi coverage and throughput. Several beta customers have signed letters-of-intent to license SercoNet's current board design for market introduction. A complete list of SercoNet beta sites includes Telco service providers, consumer electronics and cable equipment OEMs, retailers and PC OEMs.

**"The [SercoNet] product provided significant benefit … improving bi-directional throughput from 1-2 Mbit/s without the [SercoNet] installed to 14-21 Mbit/s with a [SercoNet] installed."**

**"As expected, performance with [SercoNet] at this extreme coverage fringe was excellent. [SercoNet] provided very good throughput at this previously poorly covered and virtually non-usable work location and turned it into a very viable work location."**

**--BigCustomer Field Test Report (emphasis in the original)**



## CORPORATE STRATEGY

To minimize market and development risk, SercoNet is pursuing a unique corporate strategy. The company will initially license board level reference designs to equipment OEMs, who will brand, manufacture and sell products to the marketplace. This strategy will provide SercoNet with immediate royalty revenue from its patented technology, and it will generate important market feedback and performance data that will enable continuous product improvement. In parallel, SercoNet will begin implementation of its designs as CMOS ASICs to effect system-level BOM cost reduction. The company will then transition its revenue stream from reference design royalties to IC sales.

### LICENSING OF IP PORTFOLIO

SercoNet has developed a significant IP portfolio that covers several basic wireless-to-wired hybrid network technologies. The company has sole ownership of 13 granted and 20 pending US patents. SercoNet expects to generate supplemental revenues by licensing its IP portfolio to OEMs in the hybrid networking space. The company believes that its patents cover a wide range of networking implementations that use wired backbones, including WiFi-to-HomePlug and other implementations that the company does not intend to target through product sales.

### UNIQUE COMPETITIVE ADVANTAGE

SercoNet intends to maintain a highly defensible strategic position in the market for hybrid networks through a combination of unique competitive advantages:

- By exploiting its patented technology for single modulation PHY layer "wireless-over-wired" hybrid networks, the company will offer clear price and performance advantages over alternative hybrid network designs that require cross-modulation of multiple coding schemes and complex MAC layer wired/wireless interfaces.
- By exploiting its position as a first mover in the hybrid networking marketplace, using its proven, robust reference board designs, to obtain critical technical and market feed-back that will enable rapid improvement of product designs and low-risk development of market-ready first silicon.
- By exploiting the company's extensive system expertise and field test experience in wired and wireless networking to design complex, low-cost and high-performance ASICs that offer unique performance advantages to broadband consumers and service providers.
- By exploiting its unique and extensive IP portfolio, including patents and proprietary information obtained through exploitation of its first mover advantage, SercoNet will be able to create significant barriers to entry for potential competitors.



## REVENUE MODEL & FINANCIAL PLAN

Based on conservative market penetration assumptions, SercoNet anticipates achieving US$### million in annual sales by 2010. This revenue forecast assumes SercoNet will achieve ##% market share of annual residential hybrid network installations (with residential installations consuming 2.5 SercoNet ICs on average) for a total SercoNet IC demand of ## million units in 2010. Initial revenue will be derived from reference board royalty fees generated by third-party OEM sales of SercoNet products. Board licensing will gradually be replaced by direct IC sales to OEMs, which will generate higher ASPs, and larger unit volumes through lower total BOM costs. The company's current (4Q05) burn rate is $###K / month; the company anticipates break even in 4Q07.

The SercoNet financial forecast conservatively omits any potential revenue from product sales outside the company's initial target market segment of 802.11-to-wired hybrid networks. The financial model also omits any potential revenue from IP licensing fees garnered from patent infringers. Revenue from both of these sources should constitute a significant upside to the current revenue forecast.