INTERNET PROTOCOL (IP) TELEPHONY

"Getting from where We are; To where We want to Be"

A STRATEGIC POSITION

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BACKGROUND

The term **Internet Protocol (IP) Telephony** is exploding throughout the telecommunications Industry. It is impossible to pick up an industry publication and not have two or three feature stories covering the changes coming for the industry with **Internet Protocol** and **convergence.** Microsoft defines IP Telephony as an emerging set of technologies that enables voice, data, and video collaboration over existing IP-based LANs, WANs, and the Internet. IP Telephony uses open IETF (Internet Engineering Task Force – ITEF is the primary working body that developed the TCP/IP standards for the Internet) and ITU (International Telecommunication Union) standards to move multimedia traffic over any network that uses IP (Internet Protocol). This offers flexibility in physical media and flexibility in physical location. Therefore, in theory the same ubiquitous networks that carry Web, e-mail, and data traffic can be used to connect voice communications to individuals, businesses, schools, and governments worldwide.

The perceived benefits of this technology shift are lower cost of existing services and a broadening of their means of communication that include modern video conferencing, application sharing, and white-boarding tools. In the past, organizations have deployed separate networks to handle traditional voice, data, and video traffic. Each with different transport requirements, these networks were specialized, physically distinct, and very difficult, (if not impossible), to integrate. IP Telephony blends voice, data, and video by specifying a common transport for each, effectively collapsing three networks into one. The end result will be increased manageability, a new breed of product providers, and a plethora of limitless applications.

Also, one cannot pick up an industry or high-tech business publication without being bombarded with the term convergence. A LAN term, convergence is defined as the point at which all the Internet-working devices share a common understanding of the routing topology. The word has evolved now to describe a trend where companies with traditional distinctions (computer and telecommunications) form alliances and partnerships to integrate their technologies.

The trend was set in motion in 1992 when Tele-Communications Inc. chairman John Malone told a cable-show audience that his vision of all-digital, fiber-optic networks would allow TCI and other cable operators to offer over 500 TV Channels, interactive programming, electronic mail, and telephony. This started a revolution within the cable industry that consumed several billion dollars and was in effect a bust. However, such concerns never let a good word die. In the May 17 issue of New York Times, Richard

Notebaert, chairman and chief executive of the Ameritech Corporation, wrote, " Conventional wisdom holds that convergence – the gradual blurring of telecommunications, computers, and the Internet – is primarily about technology and the inevitable clash of voice and data networks." The latest concept of convergence is that all communications – the **Internet** and the **PSTN (Public Switched Telephone Network)** - shall run over one network.

For the convergence to be accomplished there must be a standard Protocol used by all. The Internet Protocol has emerged as the most important protocol on which the Internet is based. The IP protocol is a standard that describes the software method of keeping track of the addresses for different nodes, routes outgoing messages (packets), and recognized incoming messages (packets). It allows a packet to traverse multiple networks on the way to its final destination. It is a connectionless protocol that operates at the network layer of the OSI model. Originally developed by the Department of Defense to support inter-working of dissimilar computers across a network, it works in conjunction with TCP (transmission control protocol) and is usually identified as TCP/IP.

With this background in mind lets take a closer look at this IP movement and what it is all about**. Traditional (legacy)** telephone systems and the **PSTN** have proven years of reliable service. De-regulation and the competition that emerged from the de-regulation has driven the prices of equipment and services down, while providing more choice in the market place. Traditional telephone systems have continually been enhanced with feature capabilities, and have adapted well to using new technologies to address the customer applications.

Traditional systems are based on central control, imbedded processing and proprietary dumb terminals. A key element in the design of these systems is a guarantee of bandwidth. The bandwidth guarantee has allowed voice to be processed into digital format without having to be compressed. This concept has allowed manufacturers to design and produce systems that are highly reliable. The proprietary nature of these systems makes them very good at interacting with like equipment. Because of the switching principles employed with traditional systems they can be limited in growth potential and expansion can be costly. IP networks and systems are based on totally distributed architecture where no single entity has to be in control. These networks are able to grow from the bottom up as individual subsets are added to the global packet network. IP networks are, in principle, ideal for voice/data convergence because their architecture is such that users do not have to be dependent upon a proprietary supplier to add features and applications. However trying to integrate voice onto a medium designed for data is challenging at best. There are LANs, WANS, Intranets, and the Internet. Transmitting voice on these mediums must be done knowing the bandwidth is not guaranteed, the voice is compressed, there can be packet delay and/or loss and retransmission is not permitted.

There are three areas where the voice-over placement is converging. In a true sense this **convergence**, when completed to the "text book" deployment, would be a ubiquitous network combining Voice, Data, and Video from the desktop in a given area to a desk top in another. This would eliminate the conventional voice terminals, switches, and networks as we presently use them. The major areas are: Telephone replacement, Transmission substitution, and switching alternatives. As makers of switching equipment and supporting terminals it is important to focus on the Telephone replacement and the Switching alternatives. However the Transmission area is very important and becomes the key to the rapid deployment of the technology. It is in this area that the issues of Quality-of-Service (QoS) come to the forefront. With no QoS benchmark, issues such as Voice Quality, Latency, Jitter, Packet Loss, and Bandwidth vary to extremes. These issues are easy to address in normal conditions but the real test is during stress. The overriding question remains: How are the QOS levels maintained during peak (bursty) demands for bandwidth?

Many vendors have been developing and are releasing products that are IP Telephony based. These include the large established telecommunications companies such as Avaya, Nortel, and Siemens. Other companies who are known more as computer companies are getting into the picture. The most notable are 3-Com and Cisco. There are many firms operating with venture capital and the hype, both within the industry and throughout Wall Street, has raised the attention level on this technology. There is an expectation within the financial community and the Data industry for a fast transition from the legacy products to the newer IP technology systems. However, these early IP products may not measure up to the standards set by today's highly reliable and cost-effective traditional key telephone systems. Customers and end users need to fully understand the real practical challenges that will be encountered when implementing an IP-based system.

These challenges include interoperability, reliability, security, usability, salability, and functionality. These must be individually actively addressed and overcome before these new IP products will meet user expectations, without compromising the quality values that have consistently been delivered by traditional key telephone systems. The resolution of these issues is not "if", but "when". If the market explosion projected and the penetration successes that industry hype would have us to believe are to occur over the next three years, then these issues will have to be resolved quickly.

While Samsung is truly an advocate of IP Telephony and Convergence, we are not rushing into this market unprepared. This paper is an overview of the research done on this emerging market. It will provide an assessment of the market and the drivers/restraints within the market. It provides the position that Samsung has taken on IP telephony and Convergence, the rationale behind that position, and the path to implement this position.

II. MARKET VIEW

The Customer Premise Equipment (CPE) market for North America is displaying only moderate growth, and is expected to continue with this trend. There are segments of this market where industry analysts have projected increased growth rates. This growth rate projection can be attributed to Internet Protocol Telephony.

II.A Market Size and Growth Trends

The U.S. CPE equipment and services market (*Phillips InfoTech 6-15-02*) totaled just over $17 billion in 1999. This was the height of the Y2K preparation. By 2001 the market

IP-Enabled represents a traditional system that has been equipped with station-side IP Gateway card(s) allowing IP phones and services to operate within a traditional TDM switching fabric. Most manufacturers of traditional systems have either released these systems are have them almost ready to release.

Converged Systems exhibit characteristics of both the above categories and have a combination of IP, Digital, and or Analog phones connected to a single system. The most notable of these are from Nortel (BCM) and Avaya (IP-Office).

In their projections for the next five (5) years, *Phillips InfoTech* separates the data into these three categories. Each segment shows substantial growth possibilities. However there appears to be a movement over this period to systems that fall into the converged category. The LAN-Enabled systems appear to reach their growth peak in 2003 and remain flat over the five-year period. IP-Enabled systems and Converged systems (there is a very fine line separating these by definition) show steady growth throughout the period.

While these are only projections, and the agency that projected them cannot be held accountable, it is very apparent that this segment of the market is poised for rapid growth.

In 1999 the two major established telecommunications companies, Lucent (now Avaya) and Nortel, dominated the market in the U.S. These companies accounted for 46% of the market. Since that time the market share once commanded by these companies has eroded. At the end of 2001 the market share (systems shipped) owned by Avaya was 16.3% and Nortel was 12.6%. Other Manufacturers have picked up the market share erosion from Avaya and Nortel. Inter-Tel has 11.5%, NEC has 8.4%, and Toshiba has 6.3%. Samsung is ranked as #9 with 4.1% market share.

The strength of this market is in the 40 station-and-under segment. The 2001 data from Phillips InfoTech show that there were a total of 253,732 Key/Hybrid systems shipped. The 40 station-and-under market accounts for 91% of the systems shipped. It is within this segment that Samsung has the best market presence and our intentions are to maintain that presence with our new products and to raise the bar to effectively cover the greater than 100 desktop market.

II.B Drivers & Restraints

In most applications, the life span of a Business Telephone system averages five to seven years. This equipment works very reliably over that period and these systems can be grown and enhanced over that period. Over the years this performance has become a standard for communications systems, and customers will not, and should not settle for any thing less. When the lights go out and the PC's and their networks shut down, users immediately reach for the telephone to call to correct the outage. These things being the case; why the push toward IP Telephony?

On the other hand it seems that system vendors are making announcements almost daily regarding convergence technologies, products, and/or corporate strategies. There is a great deal of enthusiasm. Market growth and revenue projections have companies scrambling to release products and position themselves to get big chunks of this market. Despite a high level of awareness, shipments of IP Telephony equipment have been relatively small to-date. Although IP Telephony is poised to revolutionize the way in which communication is conducted in the enterprise, there are many issues that are inhibiting the adoption today.

First we need to examine the motivations or drivers for pursuing IP Telephony. The traditional systems, based on switched architectures, have been increasing in Features and services and decreasing in price for 10 years. Why with such a proven track record is the market being driven to change?

Outside Pressures – The rapid growth in the computer industry, the Internet, and the markets they created have inspired companies like Microsoft and Cisco to venture into the traditional telecommunications arena with plenty of money and little industry knowledge. The entry of these giants has triggered a genuine survival concern among traditional manufacturers.

Tightly woven service/provider relationships. – The emergence of companies like Net2Phone, Delta 3, and Dialpad.com providing IP telephony integration across the Internet. Where there was a big "black hole" when accessing the Internet for calls, these companies provide solutions that are opening up this market.

Standards - The evolution of the H.323 standard has enabled the interaction of unlike systems and has allowed vendors to react quickly to provide product solutions.

Toll By-pass – The cost savings upon which IP Telephony has been marketed have created interest in the market. Although to combat this threat there have been significant reductions in toll prices, the pursuit of a network that bypasses the PSTN and its cumbersome prices continues to drive this technology. The most notable attribute of this bypass is in the international call.

Issue Resolution – The rush by vendors to release products that compete in this new and expanding IP Telephony market now means that the outstanding issues that currently prevent adoption by users may be dealt with and resolved more quickly.

Consumer Acceptance of the Internet – Consumers have accepted the Internet and have become connected at an astronomical rate. The demand for more broadband services has helped the overall improvement within the Internet. The deployment of xDSL to the home has opened a channel for IP Telephones to be remotely located with the same features and services of the telephone at the office.

The issues, or restraints, that currently prevent users from adopting IP Telephony and convergent technologies, are several. The mere existence of a technology, no matter how "hot" in the vendor community, does not guarantee its immediate and/or broad acceptance in the buying market. This technology within the voice telecommunications market faces challenges to rapid and widespread adoption for a number of reasons, including the following:

Limited applications – Vendors are still working on identifying and developing applications that can really provide a benefit to customers. The main area where applications should work together is call centers. But there is still no total solution. There has not emerged a "killer App" to justify the replacement of an existing system or the adoption of a new technology with unproved reliability. The best application that has emerged is that companies with multiple locations can tie their data and voice Networks together.

Investment Protection - Enterprises collectively have billions of dollars invested and capitalized in traditional systems and associated terminals. The larger the enterprise; the larger the investment. Since most enterprise locations amortize their systems over a five to seven year program, it will be difficult to get them to make a wholesale change in telecommunication equipment just for the sake of convergence. Associated data equipment has a life cycle of only 18 months.

Distribution Channels – Facts are that telephony sales and technical personnel don't know much about data networks, and IT networking staff aren't particularly knowledgeable about phone systems. The traditional telephony products distribution channels are through "interconnect" dealers. These organizations know their individual markets very well, and have adapted sales and pricing techniques that allow them to sell the product and be profitable. Getting these companies to change from their comfort zone to sell the new technology will be a challenge. Also finding companies that have personnel on staff that are familiar with both voice and data will not be easy. On the data side the VAR channel has developed using a very different pricing model. They have the personnel that know data and networks but do not understand the requirements for telecommunications systems. Where in the data world it is not uncommon to take a server down on a weekly basis or "re-boot" a system during the day to clear a client's PC problem, this is a practice that telephone users are not likely to get used to.

Quality of Service (QoS) – The current telephone industry is based on a reliability factor of "five nines" (99.999 percent). The world of IP telephony and convergence has no quality standards to achieve. Calls placed over the Internet (VoIP) could be hit or miss. There can be levels of quality maintained by using enterprise networks or VPN (virtual private networks). When bandwidth can be guaranteed, regardless of the traffic, then issues of latency, packet loss, and echo can be controlled. This quality comes with a price. Many times the anticipated savings are eaten up by the fact that the current network has to be upgraded to accommodate both voice and data converged.

Buyers aren't educated – The business community has reached a point where people are embarrassed if they lack an e-mail address or a Web page. And not having these business tools should be embarrassing. However these same businesses do not readily recognize new telecommunications technology products or the vendors who sell them. The inherent lack of understanding, by potential buyers, of the features and benefits of the converged technology prevents these products from reaching the heights achieved by data products alone. Once these buyers recognize that convergence is every bit as important as their data products, the race will be on. The key lies in customer awareness.

The price is not right – No surprise here. Many small businesses in particular were scared away by the entry point of computer telephony and CTI products. While a reasonably decent data network can be had for under $5000, an advanced phone system with desktop control and unified messaging will typically cost four times that much. These prices are dropping and will continue to drop as more utilization of the data network as infrastructure continues. However, convergence is still too pricey for most small offices today.

II.C Assumptions

In reviewing the market and its challenges it is important to recognize these challenges and their affect on the development of the market. In this analysis, the time frame is important. The time frame affects the market forecasts and has the greatest impact on the market over the forecast period. Based on these reasons our view on convergence includes the following assumptions and their anticipated time frames:

There will be drastic changes in the distribution structure. (2 to 5 years) – The entrance of data equipment vendors such as Cisco, 3Com, and other smaller companies has affected the distribution within the traditional market. The traditional telecommunication provider companies will adopt a more data oriented platform. There will be an emergence of a Hybrid version of the "Interconnect" telecommunications provider. This new hybrid dealer will be the key to distribution of our products.

The true opportunity lies in helping businesses ease into a converged world without having to scrap their current investment in telephone equipment. (1 to 5 years) – The average life of a telecommunications system can be up to 7 years. It will not be economically feasible for businesses to abandon their current systems and replace them in whole with an IP system. We must provide a solution that "bridges" the old and the new technology.

The migration to converged voice and data will include "Mobility". (3 to 5 years) – There is a direct relationship between the evolution of the IP telephony and the mobile (wireless) telephony markets that will affect the strategic nature of IP Telephony in the enterprise arena. Along with Data and voice convergence, will come the convergence of wireless into the IP based network. Any IP system developed must have wireless applications.

IP Telephony and convergence create a ubiquitous infrastructure with open connections for an unlimited number of developers to add value. (2 to 5 years) - This is a revolutionary fact for traditional manufacturers of proprietary equipment. The entrance of computer oriented data equipment vendors has started this revolution. Firms that are able to offer products at very competitive prices will have success. This will force the current industry to reevaluate current pricing, marketing, and distribution strategies.

The problem lies in customer perception. (1 to 3 years) – Within the telecommunications industry convergence comforts itself by reflecting on its fine inner qualities. However, those who would purchase this wondrous solution, don't really seem to care. If potential customers understand the benefits of IP Telephony and Convergence they will ultimately realize that it is every bit as important as their data products. The key lies in customer awareness. Vendors will be forced to understand that marketing budgets are self-fulfilling prophecies. "Advertise like giants, become as rich as giants".

II.D Market Positioning

The IP Telephony and Convergence markets are in the early adopter stage. During this stage (1 to 3 years) it is important for us to isolate specific segments and applications within the market based on our core business expertise and establish ourselves as the market progresses into its growth stages.

In the early stage we need to follow the strategy of "Launch and Learn". In this strategy there will be a relatively small market that provides an adequate opportunity to introduce products and match them to customer needs. During this period both internal and external sales and technical personnel can learn both the technology and the application of the benefits. The Gartner Group recommends that users test the new technology in small branch or departmental settings with less than 100 stations. This is right in line with our "Launch-and Learn" strategy.

Our position within the overall market needs to be defined, and with that definition established products can be specified and developed that match our market position. In an arena where the market is dominated by five or so major vendors it is extremely difficult to compete with an End-to-End strategy. With an end-to end strategy vendors claim to offer products from one end to the other end of the market. In essence dominating every aspect of the market. Vendors such as Lucent, Nortel, and Cisco see themselves as End-to-End vendors. At Samsung we believe the strategy that suits us, and our customers, best is "Best-of-Breed". We recognize that we are not going to be the sole vendor for our dealers and therefore the dealers are free to choose the product that best meets their sales needs. This means that we will have our success by integrating into mixed environments with equipment that is suited for customer specific applications.

This strategy requires a partnership with our dealer network that is tighter than the current dealer relationship. The Best-of-Breed allows dealers to have multiple vendors of products that need applications. This requires a level of training and confidence in assuring the dealer recognizes the need and proposes our product to meet the correct customer application. We need to arm our dealers with the information necessary to overcome the confusion within the market that will restrict sales. The profile we have today for selecting dealers will change to meet our "Best of Breed" strategy. The support presence and technical skills at the dealer level must improve. As we have painfully learned, simple adherence to standards does not ensure interoperability. Having personnel who have the technical expertise to handle both voice and data applications will be paramount. Not only will we be expecting our dealers to have the technical personnel available, we in turn must undertake a program to educate our own technical staff to meet the challenges of convergence.

Over the next five to seven years the distribution of Telecommunications products could change dramatically. Some market analysts, such as Frost and Sullivan, are predicting that with convergence comes a change in distribution from dealers to more VAR/retail distribution. The movement throughout the U.S. to improve air quality is projected to have an effect on telecommuting. The thought emerging from workplace analysts is that telecommuting enables greater productivity, efficiency, and lowers stress among employees. This could be the big "Killer App" that the market has been long awaiting. When IP telephones are installed into homes in support of telecommuting, the transition to more of a VAR/retail environment will begin. Our ability to find and engage VARs with proven experience offering convergence solutions as dealers will play a critical role in bringing the companies IP products to market.

The Gartner Group predicts the penetration rate of IP Telephony systems into the premise switching market to be 22 percent by the end of 2004. They also predict the majority of these systems will be 100 station-or-less enterprises. The challenges facing the larger sized enterprises that limit their transition to IP systems, are the costs involved in integrating both data and voice into one network, and the concerns over reliability and QoS. Therefore Gartner believes the mainstream deployment of IP Telephony systems will begin in the small enterprise sector (1 to 100 desktops). It is important that we position ourselves to be able to compete in this segment of the market.

III STA's Strategic Position

Over the past eight years there has been a movement within the telecommunications industry to converge voice and data and to take advantage of the IP Technology to provide common telecommunications. As this movement gains momentum and causes

confusion within the markets we serve and hope to serve, we have reviewed, studied, and have charted a strategy for our company, our dealers, and our customers. At Samsung Telecommunications America we have developed and believe whole heartily in the following strategy:

Graceful Convergence

The movement from traditional voice switching systems to IP-based converged systems is **evolutionary** and not **revolutionary**. Therefore we will provide product solutions that offer a migration to the new technology while maintaining backward compatibility. We believe that superior investment protection is the first and most important step in our strategy. We are furthermore committed to enhancing our current legacy products to extend their life cycle.

No compromise on quality.

Certain IP Telephony approaches are forcing customers to sacrifice quality and reliability in exchange for the perceived value of cost savings that are had by running voice and data on a single network. Reliability and quality, a trademark that has been established for years within the current telecommunications network, should and must remain the same regardless of the architecture or network platform. We must provide the customer the same experience on an IP enabled platform as a TDM platform.

Launch and Learn.

We believe that our customers should be able to "Try" IP Telephony without having to commit to an entire "forklift" change out of their system. This approach allows not only the customers to utilize integration of voice to the corporate LAN or WAN at their own pace, but allows our dealers to become familiar and comfortable with the sales and support of the technology.

Open connectivity.

We are committed to the development of a new IP Telephony switching system that will transfer the core switching functionality of traditional key telephone systems to an IP-based packet switched system. This system will have all the elements of a converged system and all the quality elements that are part of the current telephony experience. It must support architectures that thrive in an open environment.

Survival-of-the-Fittest.

We believe that in this converged world that vendors must be "Best-of-Breed" to survive. This means that we will provide products that are better in certain market segments, will be chosen by our dealers to sell in those applications, and will be purchased by end-users because they are comfortable with the support given by the dealer and the manufacturer. To become "best-of-breed" we will invest in training programs, both internal and external. We will insist that our dealers be prepared to ensure there is local support presence.

IV Rationale

The strategic position set forth by Samsung Telecommunications America is based on a balance between our core competencies today and the projections of recognized market analyst *(Frost & Sullivan, Phillips InfoTech, and Gartner Group*). During the early part of 2001 it became very apparent that the current telecommunications market was in confusion. The vendors that are attempting to enter this market with an IP-based system and with no distribution established or an embedded base to protect generated this confusion. This confusion has made companies decline or delay purchases of new or replacement systems.

With the lifespan of five to seven years for a telecommunications system and with these systems working at customer expectation levels, the opportunities at the early stage are to help businesses ease into a converged world without having to scrap their current investment. Also, faced with this onset of hype about this new technology many customers are concerned that they will be forced to adopt new convergence technology because traditional technology systems are being discontinued.

We are fortunate to have a mature Key Telephone System product line, which we are actively selling, to a developed dealer channel market. We have a new family of IP Enabled products that is selling in the marketplace and are developing and planning on introducing application driven enhancements that will support the newly emerging IP Telephony needs. These include IP Wireless Handsets, IP Networking, and IP Telephones that can be located locally or remotely. But more importantly we have an active enhancement program to ensure that our current product family continues to meet the needs of our customer base. With this sound product strategy, we are in an ideal position to leverage the strengths of our products and our markets.

We believe it is possible to grow and prosper in our market by leveraging our core competencies, while maximizing our ability to design, develop, and distribute products that meet the needs of that market. These **core competencies** are:

Highly recognized Brand Name

Strong and well-established dealer network to distribute our products.

The R&D power of a multi-national corporation

Solid digital key telephone platform with a large embedded base.

A history of continuing to enhance existing products.

Price competitiveness with a relatively high perception of quality.

Our outlook for our future is largely dependent upon our ability to ensure that we have the plans in place that will guide us through a transition within our market and allows us to grow without impacting the organization. We must be prepared to spend the money and resources necessary to accomplish tactically the strategies set forth in this plan. On the other hand we must keep a close watch on how this money is being allocated and spent. The learning of lessons from past failures can be very expensive.

The bottom line is that without proper planning and cooperation, both internally and externally, the risk of slow adoption and loss of market share are tremendous.

V Summary

The future is today. The sheer size of the media hype given to the IP telephony and convergence market, plus the power and money behind Cisco and 3Com, guarantees that traditional telecommunication, as we once knew it is history. To attain growth within this emerging market, vendors must proactively implement IP and convergent product, marketing, sales, support, and training plans.

The IP-based revenue for 1999 through 2001 has failed to account for a significant percent of the key telephone system shipments, but during these years most vendors began to position themselves to provide IP solutions. Industry analysts believe the revenue short falls were due to a failure to impress upon prospects the importance of convergence. This year's marketing strategy by vendors of IP-Based Solutions is an attempt to change this lack of positive perception. The result seems to be a confused buying market. How long will this confusion last?

There are over 60 million PBX systems and twice that number of Key Telephone systems in service today. The truth is that it's highly unlikely that all these will be replaced soon with an IP-based system. Therefore while new IP-based systems are growing the real market opportunity lies in leading business to IP solutions one step at a time. The opportunity for a "bridged" solution is huge. After all, there simply isn't a landfill big enough to house 180 million legacy telecommunication systems. It is extremely important for Samsung to provide this "bridge" solution and that the new IP-based system be developed to accommodate open standards and run on existing LAN/WAM networks.

In spite of all the current issues, those vendors who are able to recognize and then overcome the barriers will be the ones that are most successful in this convergence evolution.