any phone. Lines are accessed by pressing an associated button, which originally was a mechanical key. Internal calls can be made using an intercom button and, as in the PBX, bypass the public telephone network and public telephone charges. Key systems cannot support a large number of lines but are more economical than PBXs for a small number of lines. Consequently, key systems are typically used by small companies, generally with 40 or fewer lines.

Hosted IP systems are a relatively new service. They are suited for companies that have no main office or many mobile workers and that offer toll-free service.

Centrex or hosted PBX service, by contrast, is provided by carriers and is not owned by the enterprise. Instead, Centrex customers rent part of the carrier's central office (CO) equipment, although in some cases the carrier's equipment may be housed on the customer's premises. Each phone has a direct line to the CO. The principal advantage of Centrex is that the enterprise does not have to pay for control units, software or hardware upgrades, or maintenance. By outsourcing their telephone system, companies can devote more of their focus and resources to their core businesses. Lines can be added and there are no space requirements for equipment. A unified Centrex system permits free intracompany calls for companies with multiple locations. Centrex charges are based on the number of lines provided and the features allocated to each phone. Centrex can be considered an expensible monthly charge versus the capital outlay-based PBX systems. The disadvantage of Centrex is that monthly fees are 20–50 percent higher than the cost of operating PBXs or key systems, and the enterprise does not own or control the system.

Hosted IP systems are a relatively new service. They are suited for companies that have no main office or many mobile workers and that offer toll-free service. Hosted IP provides functionality between internal lines and mobile phones — incoming calls can be routed to wireless phones — and supports toll-free service. In effect, hosted IP provides PBX functionality as a service. Upfront costs are lower, as with Centrex, but the service menu is more limited.

PBX and Key Systems

The transition from traditional systems to IP and converged systems has been the principal development in the PBX market in the current decade. IP-PBXs operate on the LAN and treat voice as a LAN application, enabling voice to be integrated with other LAN applications. Phones are powered by transformers connected directly to AC outlets or by Power over Ethernet (PoE), which uses the Institute of Electrical and Electronics Engineers (IEEE) 802.3af standard. The growing use of Session Initiation Protocol (SIP) technology is expanding the functionality of IP phones. SIP allows easy setup of voice, data and video sessions over IP networks. SIP-PBXs use softswitch trunking rather than primary rate interface (PRI) lines or other time division multiplexing (TDM) lines. Reducing the number of PRI or TDM lines generates considerable savings. SIP-PBXs also work with legacy equipment and allow easy upgrades while providing centralized voice-mail capabilities — saving on storage space — corporate directories, follow-me services and Web conferencing. In addition to voice mail, IP-PBXs provide a company greeting, music when callers are put on hold, automatic call conferencing, call logging and tracking, and click-to-call, by which a user can click a record on a PC screen to initiate a call.

A number of new systems were introduced in 2008, many of which were targeted to small businesses. Microsoft Response Point A, for example, offers a system for companies with fewer than 50 employees. Costs are reduced by eliminating employee training programs. Linksys, a Cisco subsidiary, has a service for up to 16 users, and Jazinga has a system for up to 20 users that includes a wireless router and a unified messaging platform. Companies needing to replace or upgrade their systems are adopting IP instead of TDM. The increased availability of vendor financing is facilitating upgrades in the face of a declining economy.

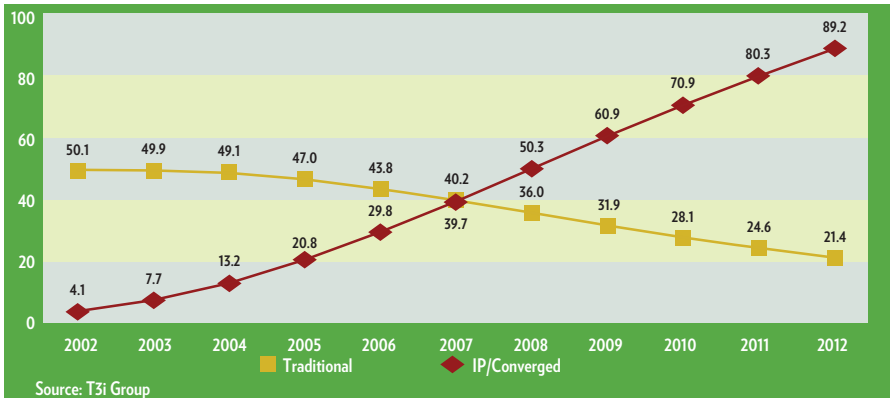
Boosted by growth in the small and medium-sized enterprise (SME) market, the IP/converged installed base overtook the traditional installed base in 2008. There were more than 50 million IP/converged PBX lines in 2008, a 26.7 percent increase from 2007, compared with 36 million for traditional PBXs. The IP/converged installed base will grow to 89 million by 2012, four times larger than the traditional installed base, which will have fallen to 21 million (see T**ables 3-2.3** and **3-2.4** and **Figure 3-2.4**).

Through 2008, more IP/converged lines have been added each year than in the previous year, with 10.6 million net new converged lines introduced in 2008, 700,000 more than were added in 2007. We expect that pattern to change beginning in 2009. With nearly 60 percent of the installed base now IP/converged, growth in the IP/converged component will slow. We expect the number of new IP/converged lines to stabilize in 2009, and net converged lines added to decline during 2010–12. Nevertheless, more lines will be added in 2009 and 2010 than were added in 2007. During the next four years, a total of 38.9 million converged lines will be added (see **Figure 3-2.5**, page 3-18).

The introduction of moderately-priced IP-PBXs targeted to SMEs is also driving migration from key systems to PBXs as the cost advantage for key systems erodes. The overall PBX installed base rose 59 percent between 2002 and 2008, while the

FIGURE 3-2.4

PBX INSTALLED BASE IN THE UNITED STATES (MILLIONS OF LINES)



The IP/converged installed base will grow to 89 million by 2012, four times larger than the traditional installed base, which will have fallen to 21 million.

TABLE 3-2.3

PBX INSTALLED BASE IN THE UNITED STATES (MILLIONS OF LINES)

Year	Traditional	IP/ Converged	Total
2002	50.1	4.1	**54.2**
2003	49.9	7.7	**57.6**
2004	49.1	13.2	**62.3**
2005	47.0	20.8	**67.8**
2006	43.8	29.8	**73.6**
2007	40.2	39.7	**79.9**
2008	36.0	50.3	**86.3**
2009	31.9	60.9	**92.8**
2010	28.1	70.9	**99.0**
2011	24.6	80.3	**104.9**
2012	21.4	89.2	**110.6**

TABLE 3-2.4

GROWTH OF THE PBX INSTALLED BASE IN THE UNITED STATES (PERCENT)

Year	Traditional	IP/ Converged	Total
2003	–0.4	87.8	**6.3**
2004	–1.6	71.4	**8.2**
2005	–4.3	57.6	**8.8**
2006	–6.8	43.3	**8.6**
2007	–8.2	33.2	**8.6**
2008	–10.4	26.7	**8.0**
2009	–11.4	21.1	**7.5**
2010	–11.9	16.4	**6.7**
2011	–12.5	13.3	**6.0**
2012	–13.0	11.1	**5.4**
2009-2012 CAGR	**–12.2**	**15.4**	**6.4**

Source: T3i Group

TABLE 3-2.5

PBX-KTS INSTALLED BASE IN THE UNITED STATES (MILLIONS OF LINES)

Year	PBX	KTS	Total
2002	54.2	38.9	**93.1**
2003	57.6	38.4	**96.0**
2004	62.3	37.8	**100.1**
2005	67.8	35.7	**103.5**
2006	73.6	32.9	**106.5**
2007	79.9	29.1	**109.0**
2008	86.3	24.8	**111.1**
2009	92.8	20.8	**113.6**
2010	99.0	17.4	**116.4**
2011	104.9	14.4	**119.3**
2012	110.6	11.9	**122.5**

TABLE 3-2.6

GROWTH OF THE PBX-KTS INSTALLED BASE IN THE UNITED STATES (PERCENT)

Year	PBX	KTS	Total
2003	6.3	–1.3	**3.1**
2004	8.2	–1.6	**4.3**
2005	8.8	–5.6	**3.4**
2006	8.6	–7.8	**2.9**
2007	8.6	–11.6	**2.3**
2008	8.0	–14.8	**1.9**
2009	7.5	–16.1	**2.3**
2010	6.7	–16.3	**2.5**
2011	6.0	–17.2	**2.5**
2012	5.4	–17.4	**2.7**
2009-2012 CAGR	**6.4**	**–16.8**	**2.5**

Source: T3i Group

key systems installed base fell 36 percent. Moreover, the key systems installed base has been declining at accelerating rates, suggesting that this component of the market is fading away. In 2008, the key systems installed based declined 14.8 percent, its second consecutive double-digit drop, falling to 24.8 million lines. The PBX installed base expanded 8 percent, the smallest gain since 2003, reflecting in part a slowing economy and in part the fact that there are fewer non-PBX enterprises remaining.

The PBX installed base will increase to 110.6 million in 2012, a 6.4 percent compound annual increase. The key systems installed base will fall at even faster rates during the next four years, dropping to only 11.9 million lines in 2012, a 16.8 percent decrease compounded annually. Overall system line growth is estimated at 2.5 percent compounted annually to 122.5 million in 2012 (see **Tables 3-2.5** and **3-2.6**, left, and **Figure 3-2.6**, page 3-19).

Total system revenue rose 2.6 percent in 2008, down from the 4.1 percent advance in 2007. Somewhat faster growth is expected during the next few years, reflecting a somewhat larger increase in the installed base and a greater share of spending going to higher-priced PBX systems than to lower-priced key systems. At the same time, the growing share of lower-priced PBXs will temper the revenue increase, as most of the growth will be in the SME component of the market. We also expect vendors to moderate price growth given the economic climate. Consequently, growth will remain at less than 4 percent annually. System revenue in 2012 will total an estimated $5.9 billion, up 3.2 percent compounded annually from $5.2 billion in 2008 (see **Table 3-2.7** and **Figure 3-2.7**, page 3-19).

Centrex/Hosted IP

For companies that either do not wish to manage their telephone systems or do not have the expertise or resources to do so, Centrex is a solution. As with every other component of the market, Centrex is migrating to IP. SMEs in particular can get

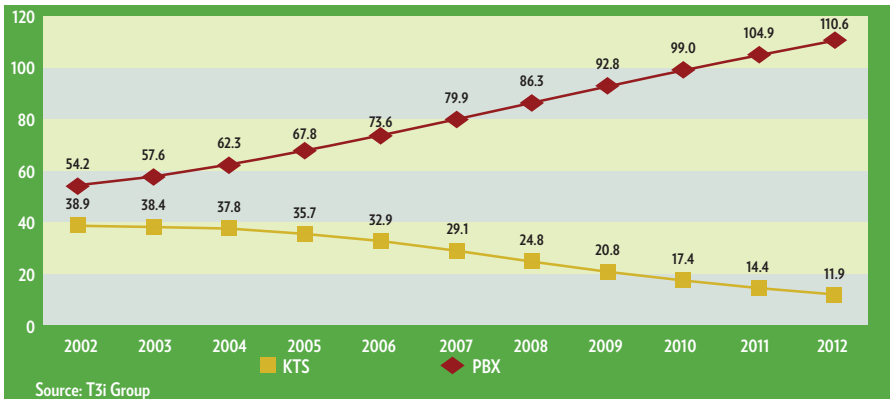
FIGURE 3-2.5

NET CONVERGED LINES ADDED IN THE UNITED STATES (MILLIONS)

We expect the number of new IP/converged lines to stabilize in 2009, and net converged lines added to decline during 2010–12. Nevertheless, more lines will be added annually during 2009 and 2010 than were added in 2007. During the next four years, a total of 38.9 million converged lines will be added.

FIGURE 3-2.6

PBX-KTS INSTALLED BASE IN THE UNITED STATES (MILLIONS OF LINES)



The PBX installed base will increase to 110.6 million in 2012, a 6.4 percent compound annual increase. The key systems installed base will fall at even faster rates during the next four years, dropping to only 11.9 million lines in 2012, a 16.8 percent decrease compounded annually. Overall system line growth is estimated at 2.5 percent annually to 122.5 million in 2012

TABLE 3-2.7

PBX-KTS SYSTEM REVENUE IN THE UNITED STATES

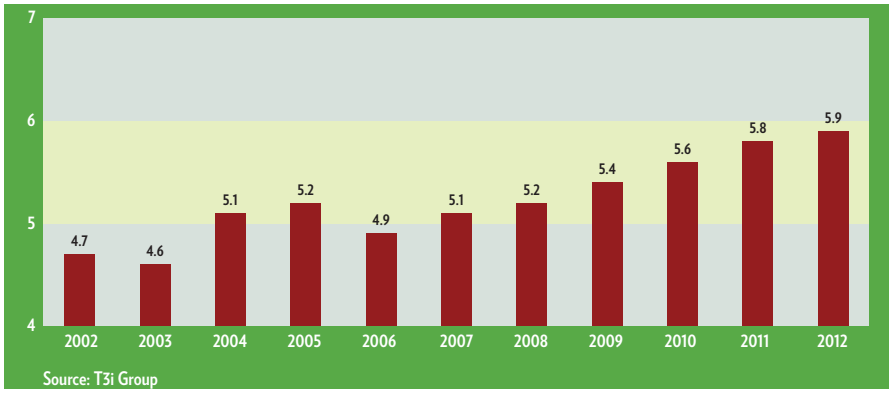
Year	Total System Revenue ($ Millions)	Percent Change
2002	4,747	—
2003	4,630	–2.5
2004	5,093	10.0
2005	5,203	2.2
2006	4,907	–5.7
2007	5,106	4.1
2008	5,238	2.6
2009	5,439	3.8
2010	5,618	3.3
2011	5,790	3.1
2012	5,938	2.6
2009–12 CAGR	**—**	**3.2**

Source: T3i Group

the benefits of IP through an IP Centrex without the difficulty of managing IP-PBXs. Like IP-PBXs, IP Centrex combines voice and data on a consolidated network. Voice calls are digitized and transmitted in packets to the network, where call features are handled in an application server. Class 5 switches, which handle traditional Centrex calls, also support IP Centrex. Gateways at the network and customer premises communicate over a packet network using IP protocols such as SIP or H.323. The network gateway depacketizes outgoing voice calls and delivers them to the switch, which transmits the calls over the telephone network. At the receiving end, the network gateway receives voice calls from the switch and converts them to packets it delivers to the customer gateway.

FIGURE 3-2.7

PBX-KTS SYSTEM REVENUE IN THE UNITED STATES ($ BILLIONS)



System revenue in 2012 will total an estimated $5.9 billion, up 3.2 percent compounded annually from $5.2 billion in 2008.

TABLE 3-2.8

HOSTED SERVICES INSTALLED BASE (MILLIONS OF LINES)

Year	Centrex	Hosted IP	Total
2002	16.5	—	16.5
2003	15.8	—	15.8
2004	14.9	0.1	15.0
2005	14.3	0.2	14.5
2006	13.8	0.6	14.4
2007	11.2	1.0	12.2
2008	10.7	1.5	12.2
2009	10.3	2.1	12.4
2010	9.8	3.0	12.8
2011	9.3	3.9	13.2
2012	8.8	5.0	13.8

TABLE 3-2.9

GROWTH OF HOSTED SERVICES INSTALLED BASE IN THE UNITED STATES (PERCENT)

Year	Centrex	Hosted IP	Total
2003	–4.2	—	***–4.2***
2004	–5.7	—	***–5.1***
2005	–4.0	100.0	***–3.3***
2006	–3.5	200.0	***–0.7***
2007	–18.8	66.7	***–15.3***
2008	–4.5	50.0	***0.0***
2009	–3.7	40.0	***1.6***
2010	–4.9	42.9	***3.2***
2011	–5.1	30.0	***3.1***
2012	–5.4	28.2	***4.5***
2009–12 CAGR	**–4.8**	**35.1**	**3.1**

Source: T3i Group

IP Centrex can also be provided using softswitch technology, a software application that runs on a server. Softswitches also use the SIP or H.323 protocol for communication. The softswitch provides instructions on how calls should be routed. For calls over the public telephone network, softswitches instruct the CPE to send the packetized transmission to a gateway that depacketizes the call and transmits it to a circuit switch. For calls within an enterprise, the softswitch instructs the CPE to send the calls over the LAN or wide area network (WAN) without the need to depacketize.

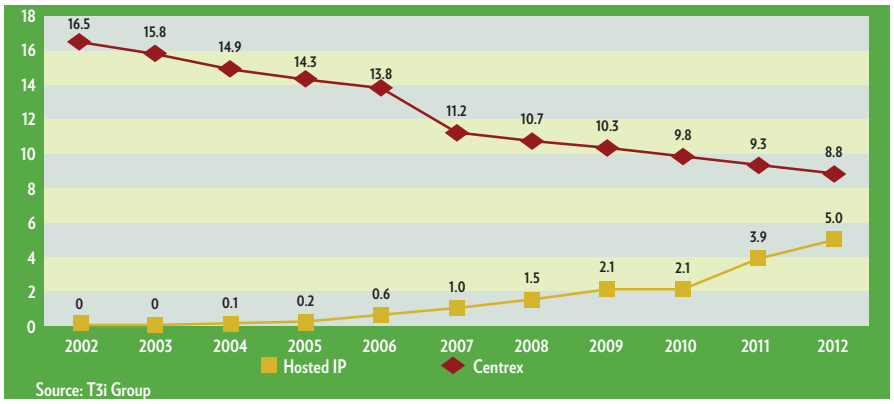
Because packet transport is relatively inexpensive and is not mileage-dependent, branch offices and telecommuters can economically share a single IP Centrex system at the main office. A single system is easier to administer than multiple systems and offers all users the same features, including abbreviated dialing and toll-free intracompany calls, regardless of location. With IP Centrex, the customer can make MACs without a service order from the carrier. In addition to traditional Centrex offerings, such as local dial tone, abbreviated dialing, voice mail and call forwarding, IP Centrex often includes unified messaging and high-speed Internet access and can be used on either an Ethernet connection or a regular phone. During low-call periods, additional bandwidth can be allocated to data transmissions.

Hosted IP is a relatively new offering, introduced in 2004. Virtual PBX is one of the leading suppliers. Hosted IP includes a follow-me feature that allows the system to try a series of numbers, including wireless numbers, for each employee. Centrex and most PBX systems send calls only to phones that are physically connected to the PBX. Hosted IP targets small businesses. SMEs are looking for opportunities to reduce their overhead costs, and many are switching to hosted services.

The Centrex market has been falling, while the hosted IP market has been increasing. Between 2002 and 2008, the number of Centrex lines fell 35 percent to 10.7 million from 16.5 million. The Centrex market has been losing ground to IP-PBXs

FIGURE 3-2.8

HOSTED SERVICES INSTALLED BASE IN THE UNITED STATES (MILLIONS OF LINES)



The hosted IP installed base is expected to rise to 5 million lines by 2012, a 35.1 percent compound annual increase.