

Hosted Services—It's Not Your Father's Centrex

by Jay Brandstadter

For those considering IP telephony alternatives, the hosted PBX offers the key advantages and economies of scale of the centralized approach and the rich feature capability and flexibility of the IP-PBX: truly, the best of both worlds.

Can Centrex survive or perhaps even thrive in the era of convergence? The PBX has dominated enterprise voice communications for many years. *Hosted* or “centralized” voice services, often called *Centrex*, had been in decline for some time when voice over Internet protocol (VoIP) started to accelerate in the late 1990s. The capabilities and possibilities of the emerging IP-PBX added to the attractiveness of premises-based solutions for the enterprise. Centrex has significant value for many users: It eliminates most of the expense of buying and operating a PBX, and it has key central-solution attributes, such as easy growth/ scalability and use of highly reliable carrier-class platforms. Centrex success has been limited, however, and has generally not kept pace with premises-based solutions in functionality, flexibility, and cost-effectiveness.

What can be done to revitalize Centrex and give telephone companies and other service providers a hosted offering that competes with the premises-based solution, especially the IP-PBX? The movement to communications convergence and the economic downturn have been accompanied by new challenges and new ways of looking at old problems. Some believe that a new breed of competitive hosted voice services has already arisen. These solutions are driven by a number of factors including the following: (1) the inherent advantages of IP communications, (2) advances that allow the limitations and inflexibility of original-generation Centrex to be overcome, and (3) renewed attention to outsourcing in the current economic climate.

There are analyses and trade-offs between hosted approaches—some of which include the Centrex label—and customer-premises voice systems. The terminology of these variations in IP-based telephony is itself confusing and a little intimidating to the uninitiated. For example, what are IP Centrex, Centrex IP, IP-PBX, and hosted PBX? How do these alternatives compare?

Historical Perspective: How Did We Get Here?

A brief historical perspective may make our examination of IP telephony alternatives more meaningful. *Centrex* or provision of PBX capabilities from the telephone central office (CO) was made possible by computer-controlled switch technologies. Early on (in the 1960s and 1970s), the feature and function set of the typical PBX was not particularly robust, so replicating it was fairly straightforward. Also, early on, the phone companies (AT&T, in particular) retained the dominant position in PBXs. However, over time, the gap between premises-based PBX capabilities and the less functional version “hosted” by the CO grew significantly.

The rules changed with divestiture in 1984. All of a sudden it wasn't just an internal accounting exercise when PBXs were sold— it was lost revenue. The phone companies needed a competitive price-performing Centrex product to do battle with the customer's PBX. In the last 15 years or so, PBX functionality has continued to grow and expand, and Centrex has hardly kept pace, even with ISDN added to the mix. However, Centrex has found some success in generic small medium enterprises (SME) and selected large-scale deployments in government, education, healthcare, and commerce.

The limited Centrex success in SME was due, in large measure, to the lack of cost-effective premises-based offerings for that segment. Penetration by Centrex in many of the larger deployments was because of limited staff, resources, and infrastructure in the user organization. In the main, however, feature/functionality richness, user control, and favorable ownership economics have maintained the PBX as the dominant approach. Moreover, Centrex providers were typically slow to respond to users' needs and charged high prices for even simple moves, adds, and changes (MACs).

Certainly the technologies of IP telephony and convergence have changed the landscape. As noted, the IP-PBX emerged in the late 1990s, posing not only new threats to traditional Centrex but also new opportunities for Centrex and Centrex-like hosted solutions.

IP Telephony Options

There are numerous ways to provide IP telephony at the premises of an enterprise or organization. In the legacy circuit-switched environment, the user site either had local switching equipment, such as a PBX or key system, or it did not. If the site didn't have that equipment, then its phones received service from a switch located elsewhere—for example, Centrex service provided from a CO. There were a couple of variations of this model: A few lines (or phones) could be handled as “off-premises” extensions of a distant switch, and “remote” switches, connected via T1s (or ISDN PRIs), could extend the range of a distant switch for larger groups of users. These means of extending the range of a switch apply to both PBX and Centrex environments. Physical distance is a significant factor in legacy telephony; but many options change, and distance limitations are basically eliminated with the openness and geographic independence of IP communications. This includes the reduction or elimination of many distance-sensitive costs (i.e., mileage charges) of legacy telephony. Further, there is now more room for new kinds of IP telephony service providers in addition to the previous model of the end-user organization or the local carrier as service provider.

The IP-PBX has, of course, received significant attention in the last 4 to 5 years. The following are three variations of this system:

1. **IP-enabled**, where the legacy PBX has additional interfaces for IP trunks and/or IP lines but retains the time division multiplex (TDM) switch and everything else
2. **The converged (or hybrid) approach**, which has both native IP networking and the TDM switch fabric for legacy connectivity and CPE
3. **The client/server model**, which is an all-IP approach with appropriate gateways or “media converters” for interfacing to legacy lines/trunks, devices, and the PSTN.

There are analogues of these approaches in Centrex and hosted options. Note that two significant aspects of the IP-PBX are the applications and services provided to users in addition to and often far in excess of basic telephone capabilities.

Looking at adding IP capability to the Centrex /hosted solutions, one could start with the “big iron,” the Class 5 switch (e.g., 5ESS, DMS 100) in the CO, and give it IP capabilities. Centrex IP is, in fact, IP-enabling the Class 5

switch with IP interfaces or added IP adjunct equipment to deliver Centrex services over an IP network to leverage IP transport. The Lucent iMerge approach is an example of this, as is the Nortel Succession Centrex IP. The key is that the Centrex features remain resident in the Class 5 switch and are the same for IP or legacy endpoints. Centrex IP, as the name implies, starts with Centrex; in fact, one can remember or interpret it as Centrex *delivered by* IP with the *delivered by* implied. It also starts with and, by and large, retains the limited feature set of legacy Centrex. Vendor nomenclature confuses this definition since Lucent refers to iMerge as IP Centrex, but the solution is clearly IP-enabling the TDM CO.

IP Centrex in name and architecture starts from the perspective of an IP-based solution. A key difference between this approach and Centrex IP is that an applications server platform provides Centrex features, call control, and other line-side capabilities. There are two basic architectures for IP Centrex. The first allows the Class 5 switch in the CO to be retained for network functionality, such as number translation and SS7 interconnection, and uses the applications platform to supply calling features, voice messaging, and the like. This approach is referred to as the *Class 5 Extension* architecture and is a hybrid that is somewhat analogous to the converged/hybrid IP-PBX. More important, it allows carriers or service providers to utilize their existing Class 5 switches and offers an incremental migration path to hosted IP services.

The second approach is the *softswitch* architecture that replaces the Class 5 switch with a softswitch media gateway and applications server. The softswitch typically provides routing, trunking, translations, and most call-control/management services. This architecture is similar to the client/server model and to some is a “pure” form of IP Centrex, since the Class 5 is replaced. The approach certainly applies to areas with minimal TDM infrastructures (e.g., developing regions) and to new carriers offering IP voice.

The following chart summarizes the architectural analogies between premises and hosted approaches.

	Premise	Hosted
IP-enabled	Legacy PBX with IP lines and/or trunks	Centrex IP
Converged/hybrid	PBX with TDM fabric and IP	IP Centrex-Class 5 extension
Client/server	IP-based PBX	IP Centrex-softswitch

Figure 1. Qualitative ratings of VoIP alternatives

Attribute	Centrex IP	IP Centrex	Hosted PBX	IP-PBX
Feature set	L-M	L-M	H	H
Advanced apps	L	L	M-H	M-H
Reliability	H	H	H	M
Scalability	H	H	H	M
VoIP migration	M	M-H	M-H	L-M
OAM&P	M	M	H	L-M
Open/standards	M	H	H	L
Multisite nets	M-H	H	H	L-M
Future proof	M	H	H	L-M
Ease of install	H	H	H	L
Web integration	M	H	H	H
24/7 support	H	H	H	L
Disaster recovery	H	H	H	L-M
Productivity	L	L-M	H	H
Mixed technology	M	H	H	M
Customer support	L-M	L-M	M	H
Mission-critical	H	H	H	L-M
TCO reciprocal	L	L	H	M

L=Low, M=Medium, H=High

Source: Delphi, Inc.

Premise-based devices and systems connect to the IP Centrex structure via integrated access devices and other interfaces as shown in Table 1.

A recent development in hosted voice evolution is hosted PBX services, which enhance IP Centrex to be feature or function competitive, if not richer, than the IP-PBX. So far, we've seen ways of replicating Centrex in an IP network environment. But since the feature /function gap between Centrex and PBXs (IP or otherwise) is so great, there is much to do before a Centrex variant can be more acceptable than a PBX-based solution. IP Centrex may be acceptable to many SME customers, but more capability in a hosted solution is needed for the larger, often distributed, enterprise or organization. Either architectural framework of IP Centrex discussed previously can be enhanced by the addition of application server software and additional application servers, if needed, to provide unified messaging, instant messaging and presence, call centers, find-me/follow-me, call screening, and a variety of more robust and comprehensive features and capabilities. Moreover, the hosted PBX from its origins retains the carrier-class and mission-critical attributes that are generally beyond the reach of the IP-PBX.

Comparing the Options

Figure 1 is a qualitative comparison of the VoIP options already addressed. Note the following:

- The Centrex IP and IP Centrex options are fairly close, but the edge is given to the IP Centrex approach because of its flexibility in external servers, lower reliance on legacy Centrex, and migration ease to more robust hosted alternatives.

- IP Centrex and hosted PBX provide Web integration for a variety of purposes, including browser-based tools for customer management of MACs and phone features. This is faster and more economical than previous Centrex offerings in which these functions were the responsibility of the service provider.
- The reciprocal or inverse of total cost of ownership (TCO) is used to maintain consistency in low, medium, and high ratings (i.e., so L (low) means highest cost and hence the lowest rating, which is the case, typically, for the Centrex IP option) .
- The hosted PBX alternative shares the economies of scale of Centrex, such as carrier-class reliability, scalability, and support, and the feature/application richness of the IP-PBX. In addition, it is, typically, the lowest cost option because of factors like access costs (T1 vs. PRI), use of open, standard CPE, and operational and maintenance staff and support cost reductions.

There are numerous features that can be added to IP Centrex to construct the more capable and agile hosted PBX. This is illustrated in Figure 2. Among the key added capabilities as noted previously are unified messaging, instant messaging, and presence features. In many respects, it is a snapshot view based on current technologies and current user requirements. The hosted voice architecture and its openness permit new servers and software to be added as conditions and market demands warrant. This kind of flexibility is a significant improvement to previous telephone industry attempts at service enhancement and service creation, which were constrained by vendor-proprietary, closed CO platforms.

Figure 2. IP Centrex—Hosted PBX feature comparison

IP Centrex	Added with hosted PBX
Basic features	Call management
• Call forward	• Click-to-dial
• Call transfer	• Phone lists/directories
• Call waiting	Unified messaging
• Last-number redial	• Outlook integration
• Consultation hold	• Voice mail
• Calling-line ID	• Facsimile/e-mail
• Three-way calling	Instant messaging and presence
Dialing features	Call screening
• Extension dialing	• Ringing priority/styles
• Speed dial	• Call accept/reject
• Calling plans	Remote office
Other Features	Other advanced features
• Hunt groups	• Alternate numbers/ shared appearances
• Voice messaging	• Auto attendant/attendant console
• Voice portal	• Account/authorization codes
• Web/browser-based MACs	• Call center applications

Figure 3. Hosted PBX versus IP-PBX comparison

Attribute	Hosted PBX	IP-PBX
• Scalability	• Essentially unlimited	• Typically, 1-10K users • Limited numbers of IP phones
• Multisite Networking	• Uniform dialing plans • Full feature set • Centralized management	• Hard-to-manage dial plans • Limited network features • Service islands
• Total cost of ownership	• Lower cost with outsourcing	• Higher costs overall: key +: Staff and support Access (PRI vs. T1) Limited CPE choices
• Open and standards	• Open and third-party CPE • SIP-based	• Limited, closed CPE • Major proprietary content
• Reliability, resiliency, and survival	• Carrier-grade Platforms (typically well over five 9s) • Cost borne by service provider • Sun Solaris and other mission-critical elements • Robust IP networking, including geographic redundancy	• Typically, five 9s only by complex, expensive methods • Cost borne by enterprise • Use of Windows and other less-hardened elements; Unix/Linux use growing • Software reliability and churn remain an issue
• Technology risk	• Borne by service provider	• Borne by enterprise
• Operations and management	• Centralized system management • Located at CO and/or data center • Supports multilocation and multi-tenant usage	• Separate management systems • Located at customer site • Typically supports single site, Non-networked

Source: Delphi, Inc.

Because the features, functionality, and flexibility of Centrex IP and IP Centrex options are clearly not competitive with the IP-PBX, they can be removed from further consideration. Figure 3 outlines a comparative analysis of the hosted PBX versus the IP-PBX. The bottom line is that the hosted PBX has distinct advantages over the IP-PBX alternative: The application/feature gap has been closed, the location-independence nature of IP communications for the multisite user is leveraged, economies of scale are realized, and new technologies integrated easily. Multisite enterprise networking is an important edge for the hosted

PBX versus the IP-PBX. Generally, a network of multiple IP-PBXs (and/or legacy PBXs) does not have a large, common set of features at each site; moreover, constructing a uniform dial plan and overall management of that network are very difficult. These are issues for PBXs and IP-PBXs from the same vendor; the problem is exacerbated significantly in a multivendor network. The hosted PBX overcomes these problems and has the scalability to handle the required scope of the enterprise network.

Also, generally, the hosted PBX has a lower TCO than the IP-PBX. For example, there are certainly advanced capabilities on today's IP-PBX; however, for the most part, they are premium items when they are available at all. The economies of scale of the hosted approach can make these new advanced features available at significantly less cost to users than their cost with an IP-PBX. Further, new customer features can be added and integrated into the applications servers of the hosted PBX faster, in

general, than the process of modifying IP-PBX software generics.

Hosted IP solutions are certainly part of a paradigm shift that is changing the way voice services are delivered and how providers and users alike think about voice in this age of convergence. We now know that hosted voice—the hosted PBX, in particular—“is not your father's Centrex.”

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