



Lab Testing Summary Report

January 2005
Report No. 050128

Product Category:
Large IP PBXs

Vendor Tested:
Alcatel ESD

Product Tested:
**OmniPCX
Enterprise**



Key findings and conclusions:

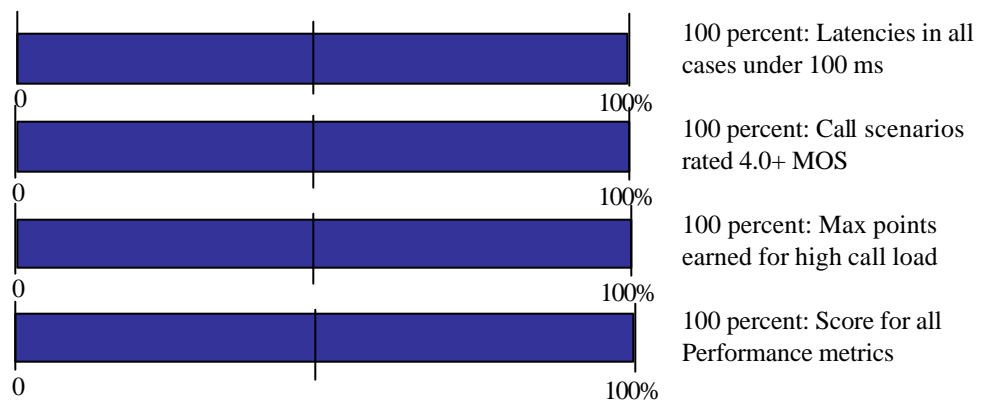
- Alcatel's OmniPCX Enterprise was rated the "**Best Performing IP PBX**" in latest public review of IP PBXs, including Cisco and Avaya
- The OmniPCX was the only system of those tested to earn a perfect Performance score
- Alcatel delivered the best across-the-board performance results, in tests including: call quality, low latency, high-availability features, and successful high-load call completion

Alcatel ESD recently submitted its OmniPCX Enterprise for an open competitive review of large IP PBXs from leading vendors, conducted by independent test lab Miercom, and sponsored by *Business Communications Review* (BCR) magazine. The Alcatel system emerged as the "Best Performing IP-PBX, Large Systems" winner from among the participants, which included competitive high-end IP-PBX systems from Cisco, Avaya, Siemens and ShoreTel.

From Miercom testing of IP PBXs over the last few years, the OmniPCX has consistently emerged among the top three performers. Alcatel's product package has evolved to keep pace with competitors by delivering advanced technology on a single platform, offering a rich feature set, and, as its award attests, exhibiting superior performance.

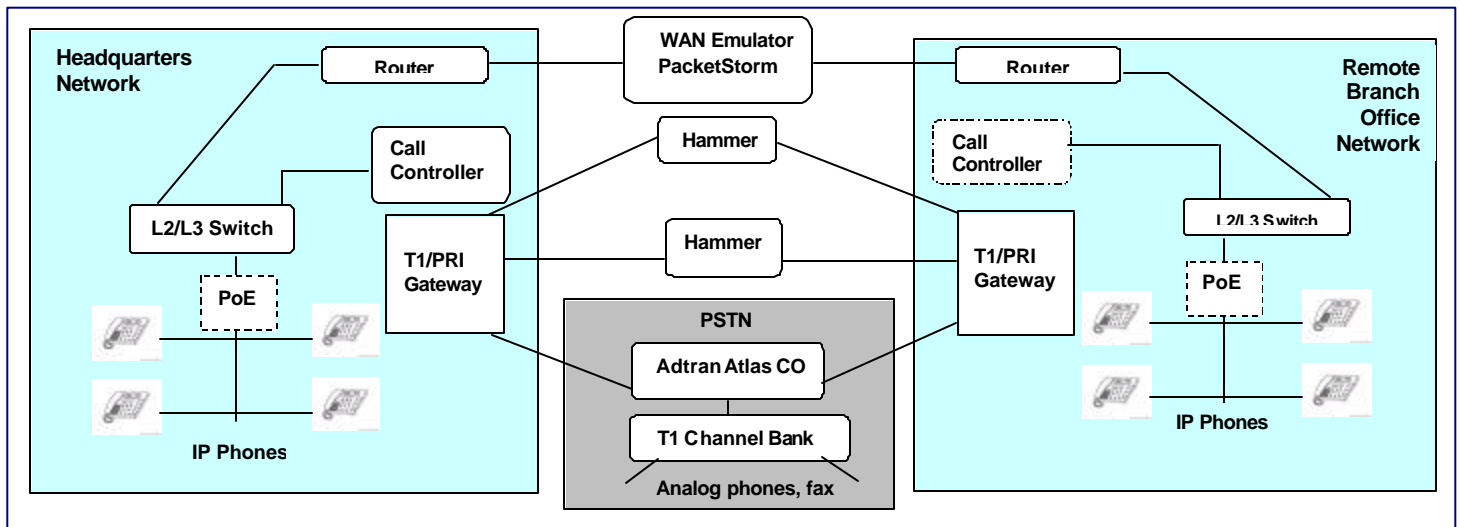
The results of this review were published in the January 2005 issue of *Business Communications Review* (BCR), which sponsored and commissioned the testing. The comprehensive methodology examined the IP PBXs in six categories: Architecture, Endpoints, Management and Ad-

Alcatel OmniPCX: Key Performance Achievements



The OmniPCX Enterprise was named the "Best Performing IP PBX, Large Systems," in open competitive testing for BCR Magazine. The bars above highlight some of the product's key performance results.

Large IP-PBX Test Bed



About the testing... Miercom's "Large IP-PBX" test bed consisted of two "simulated" sites, a company headquarters and a "remote" branch office, connected by an IP-WAN link. At "headquarters" the network infrastructure included Extreme Networks Summit 48 switches and a Cisco 7200 LAN/WAN Router. The same network structure was deployed at the remote site. The two sites were also connected by T1 links through an Adtran Atlas 800 central-office switch simulator, this to test failover and re-routing scenarios. Fax support and other analog connectivity were also tested via a Carrier Access Corporation Access Bank II channel bank. Vendors provided their own PoE (Power over Ethernet) to power their IP hard phones. A PacketStorm Hurricane 1800E Network Emulator was used to simulate a typical IP LAN or "campus" environment, as well as a simulated IP WAN link over the Internet. For VoIP connection-quality tests this device applied latency, packet loss and jitter to simulate various call scenario environments.

All vendors' IP softphones were run on the same Compaq Presario 2500 laptop, and employing a Plantronics DSP-400 USB headset. Two Empirix Hammer Systems – a Hammer FX and a Hammer LoadBlaster 500 were used to generate the call loads required in the Performance tests. Various monitoring systems were used during the testing to verify network traffic and other VOIP operational characteristics. These included Fluke Networks' Optiview Protocol Expert; Ethereal; and the BrixMon application with the Brix 100 Verifier from Brix Networks.

ministration, Features, Security and Performance. Alcatel emerged with the only perfect score in the Performance category.

A Top-Three IP PBX

Emerging again from this latest competitive testing among the top-three "Large IP-PBX" performers, Alcatel's IP-telephony system fared well in all six criteria. For example, Alcatel placed second in the Architecture category. This was due in part to the multiple levels of redundancy and survivability supported by the system:

- Local host-standby, back-up call control, which supports fail-over of call control with a disruption of only 19 seconds.
- Signaling Back-up, which lets a site circumvent a failed IP connection.
- Silent Call Server, which lets a call controller

module in a media gateway take over in the event of a main-controller failure, and

- Full remote back-up, where a back-up call controller is situated remotely.

These redundancy and fail-over scenarios were all tested, and found to work reliably.

Added security

The OmniPCX system's security has also been enhanced. Miercom had a first look at Alcatel's forthcoming encryption capabilities. It turns out that Alcatel succeeded in implementing encryption of IP-voice streams with no perceptible degradation of voice or connection quality, and no added latency.

Indeed, as shown on the call-connection quality ratings in Fig. 2, Miercom MOS (Mean Opinion Score) ratings of remote IP calls,

between two IP phones, G.729 vocoding and “Internet” impairments – averaged 4.24 (Scenario 4), well above the target “toll quality” rating of 4.0. And with encryption applied in the same environment (Scenario 5), the average MOS rating was nearly identical, 4.23, and in both cases well above the average for all other vendors

Award-winning performance

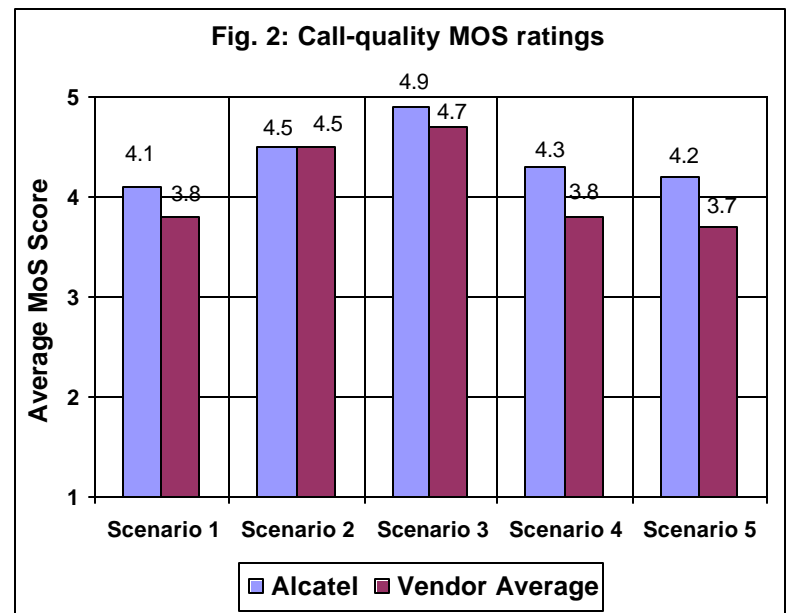
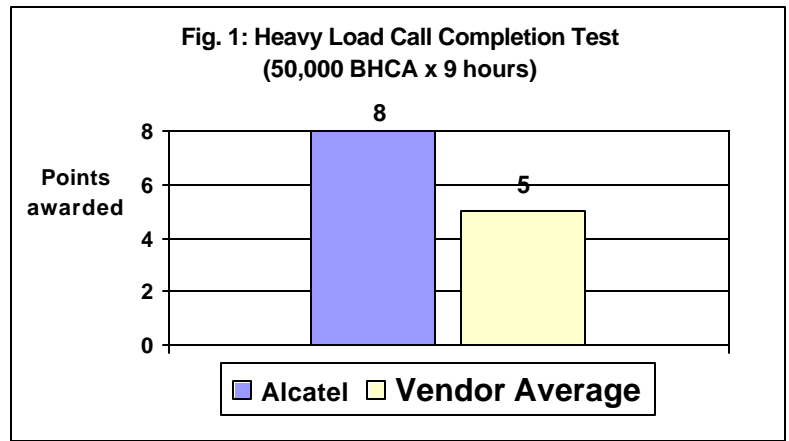
The Alcatel system’s most conspicuous distinction, however, was in Performance, a category in which the OmniPCX Enterprise earned the only perfect score, of all the systems tested.

Two of the key performance achievements are shown in the adjoining figures:

- By being able to handle an extremely heavy call load (50,000 call attempts per hour), for a sustained period (nine hours), the OmniPCX earned full credit (8 points, out of the total possible 100 points).
- Call-quality MOS ratings that were in all cases above the respectable MOS threshold of 4.0 (on a 5-point MOS scale, with 5 being excellent), and in most cases rated well above the average of all the other vendors.

The Performance criteria category, in which Alcatel earned a perfect 20-point score, also included latency measurements and a check of the vendor’s high-availability and survivability features. Regarding latency, the Alcatel system demonstrated one-way latencies under 100 milliseconds in all scenarios involving its IP hard phones. Even with encryption, latency was well under 100 milliseconds, with both G.711 and G.729 low-bandwidth vocoding.

The OmniPCX package has evolved to keep pace with competitors by delivering advanced technology on a single platform, offering a rich feature set, and, as its award attests, exhibiting superior performance.



Scenario	Endpoint	Vocoder	Pkt Loss	Latency (one way)	Jitter
1: “Road Warrior”	Soft-phone	G.729	1%	+100 ms	+/- 20 ms
2: “Ware-house”	IP Wire-less	G.729	0	< 5 ms	0
3: “Local office”	IP hard phone	G.711	0	< 5 ms	0
4 “Tele-worker”	IP hard phone	G.729	1%	+100 ms	+/- 20 ms
5: Secure Remote”	IP hard phone	G.729 w encryp’n	1%	+100 ms	+/- 20 ms

Fig. 3: Call Load Capacity of Systems Tested

Alcatel	Avaya	Cisco	ShoreTel	Siemens
300,000 BHCA	300,000 BHCA	125,000 BHCA (250,000 max per cluster)	50,000 BHCA per controller	112,500 BHCA

Miercom-Rated “Best Performing Large IP PBX”

Based on Miercom’s thorough workout of this IP-telephony system – and examination of its configuration, operation and features, as described herein – we proudly attests to the Alcatel OmniPCX Enterprise’s performance, noting in particular:

- Maximum credit by demonstrating under-100-ms one-way latency in all tested scenarios
- Maximum credit for handling heavy call loads (tested at 50,000 BHCA for 9 hours)
- Maximum credit for receiving over-4.0 call-quality MOS ratings on all call scenarios.



With the documented results from these and all other hands-on performance tests, the Miercom test staff names the Alcatel OmniPCX Enterprise system the “Best Performing IP PBX, Large Systems.” The award is based on the Alcatel system’s exceptional achievement in all performance aspects, and considering the comparable performance of competitive Large IP-PBX systems from Avaya, Cisco, ShoreTel and Siemens.



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About Miercom’s Product Testing Services...

With hundreds of its product-comparison analyses published over the years in such leading network trade periodicals as *Business Communications Review* and *Network World*, Miercom’s reputation as the leading, independent product test center is unquestioned. Founded in 1988, the company has pioneered the comparative assessment of networking hardware and software, having developed methodologies for testing products from SAN switches to VoIP gateways and IP PBX’s. Miercom’s private test services include competitive product analyses, as well as individual product evaluations. Products submitted for review are typically evaluated under the “NetWORKS As Advertised™” program, in which networking-related products must endure a comprehensive, independent assessment of the products’ usability and performance. Products that meet the appropriate criteria and performance levels receive the “NetWORKS As Advertised™” award and Miercom Labs’ testimonial endorsement.



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