

Avaya B100 Series Conference Phones

Call Quality and Feature Evaluation versus Polycom

EXECUTIVE SUMMARY

While conference phones have been ubiquitous in office environments for decades, today's focus on distributed and collaborative work environments makes them ever more important. Avaya has designed their B100 series of analog and VoIP conference phones to leverage advances in audio processing and noise suppression that translate into improved sound quality to the user.

Avaya commissioned Tolly to evaluate the voice quality and feature set of their B100 family of conference phones against comparable units from Polycom, Inc. In a series of small-scale, subjective tests of voice quality, the Avaya B100 series conference phones compared favorably with the Polycom offerings. (See Figure 1.) Tolly also verified that the Avaya conference phones provide additional value-add features, such as integrated call recording, not found in comparable Polycom products.

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THE BOTTOM LINE

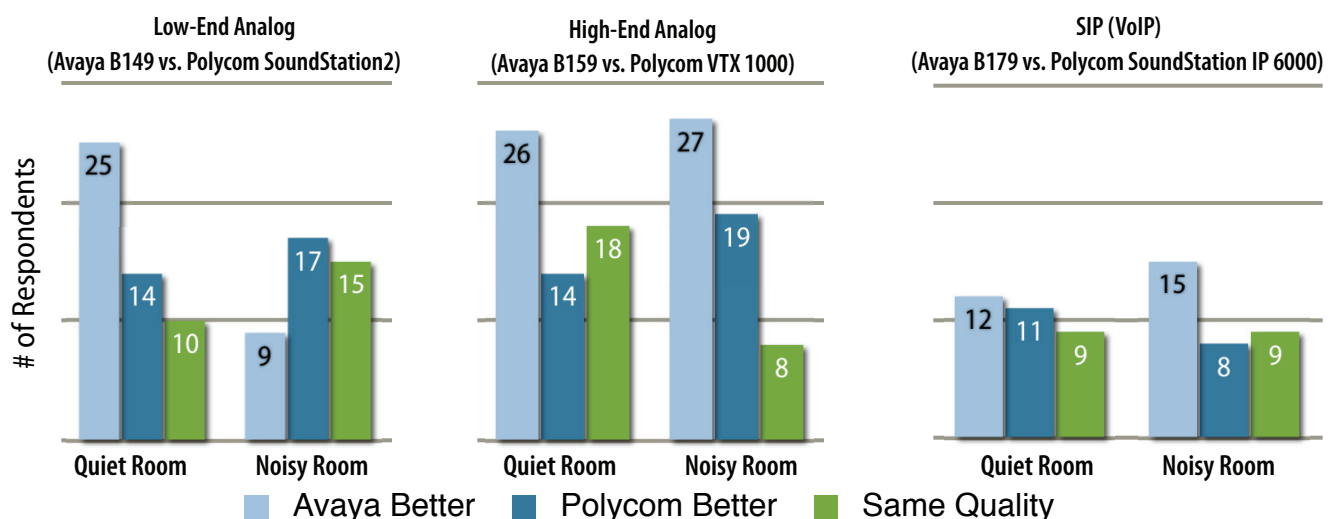
The Avaya B100 series conference phones provide:

- 1 Sound clarity even in noisy environments via noise-canceling microphones
- 2 High-quality wideband audio via OmniSound 2.0 technology
- 3 Rich feature set including hand-off to mobile devices and integrated call recording via secure digital (SD) memory cards

Subjective Conference Phone Voice Quality

Half-Duplex Testing (One Person Speaking) At Ranges of 1.5 to 7 Feet

Reported as number of test participants who favored each conference phone in each class



Notes: Double-blind test with 36 office workers as subjects. Some subjects did not participate in all scenarios. Half-duplex (i.e. one person speaking) communications between phones in different conference rooms. "Noisy" room consisted of ITU traffic noise generated 7 ft from the phone under test. These tests were not formal mean opinion score (MOS) tests. Results are the sum of both test cases. See Test Methodology section for details.

Source: Tolly, September 2011

Figure 1



Executive Summary (con't)

Tolly engineers built a two-office conference phone environment and asked 36 office workers to provide their opinions on relative voice quality when the same audio was transmitted over pairs of the systems under test.

The audio being evaluated consisted of industry-standard audio files being played across professional quality speakers in the “talking” conference room to assure that input voice would be the same for all tests.

Importantly, the test was a “double-blind” test where neither the subjects nor the test

administrator was aware of which system was being tested at a particular time.

Tests were conducted on three different pairs of phones for each vendor. In one set of tests the “talking” conference room was quiet and in another, a speaker 7 ft from the conference phone played a file of traffic noise.

In this A/B test, listeners were asked to compare two sets of phones and rate one or the other as being better/worse or the same. (See Test Methodology for details.)

In all scenarios with all phones, the Avaya solution was rated by the listeners as being comparable to the Polycom offering.

While voice quality tests were performed with only one party speaking, it is also

Avaya, Inc.

B100 Series Conference Phones

Call Quality and Features



*Tested
September
2011*

important for both sides of the conversation to be able to both speak and hear simultaneously - full-duplex (bidirectional) audio. Tolly engineers verified that both Avaya and Polycom provide this feature.

Partial Conference Phone Connectivity and Feature Checklist

Phone Class	Model	Features						Connectivity Options		
		Call Recording	Phone Book	Web Interface	Software Upgrade	Bidirectional Audio	Wideband Audio	USB VoIP	PA System	Mobile Phone
Low-End Analog Conference Phones	Avaya B149	✓	✓	N/A		✓				
	Polycom SoundStation 2		✓	N/A		✓				
High-End Analog Conference Phones	Avaya B159	✓	✓	N/A	✓	✓	✓	✓	✓	✓
	Polycom VTX 1000		✓	N/A	✓	✓	✓			
SIP Conference Phones	Avaya B179	✓	✓	✓	✓	✓	✓		✓	
	Polycom SoundStation IP 6000		✓	✓	✓	✓	✓			

Note: PA system connection not tested because of test bed limitations. Mobile phone connectivity is for select brands/models.

Source: Tolly, September 2011

Table 1



Usability Features

Functionality

With its integrated secure digital (SD) memory card, all members of Avaya's B100 product family provide call recording capability - a feature not available on any of the Polycom models evaluated.

All B149 and B179 models support Avaya's proprietary wideband audio technology providing greater frequency response than standard audio.

Furthermore, the Avaya offerings match their Polycom counterparts in providing

other important features such as: phone book, software upgradability, and a web interface for the SIP model.

Connectivity

While conference phones have traditionally been stand-alone units, enhanced connectivity options can provide significant benefits for users.

Several of the Avaya B100 models offer connectivity features not found in any of the Polycom conference phones evaluated. (See Table 1.)

Mobile Phone

The analog Avaya B159 allows a mobile phone to connect to, and thereby take advantage of, the B159's high quality speakerphone and microphone. This conveniently turns the mobile phone into a business-quality speakerphone.

VoIP USB (Soft Client Applications)

The Avaya B159 also provides USB connectivity to PC/Mac computer systems. This allows popular VoIP programs like Skype (and similar programs) to become business-quality speaker phones.

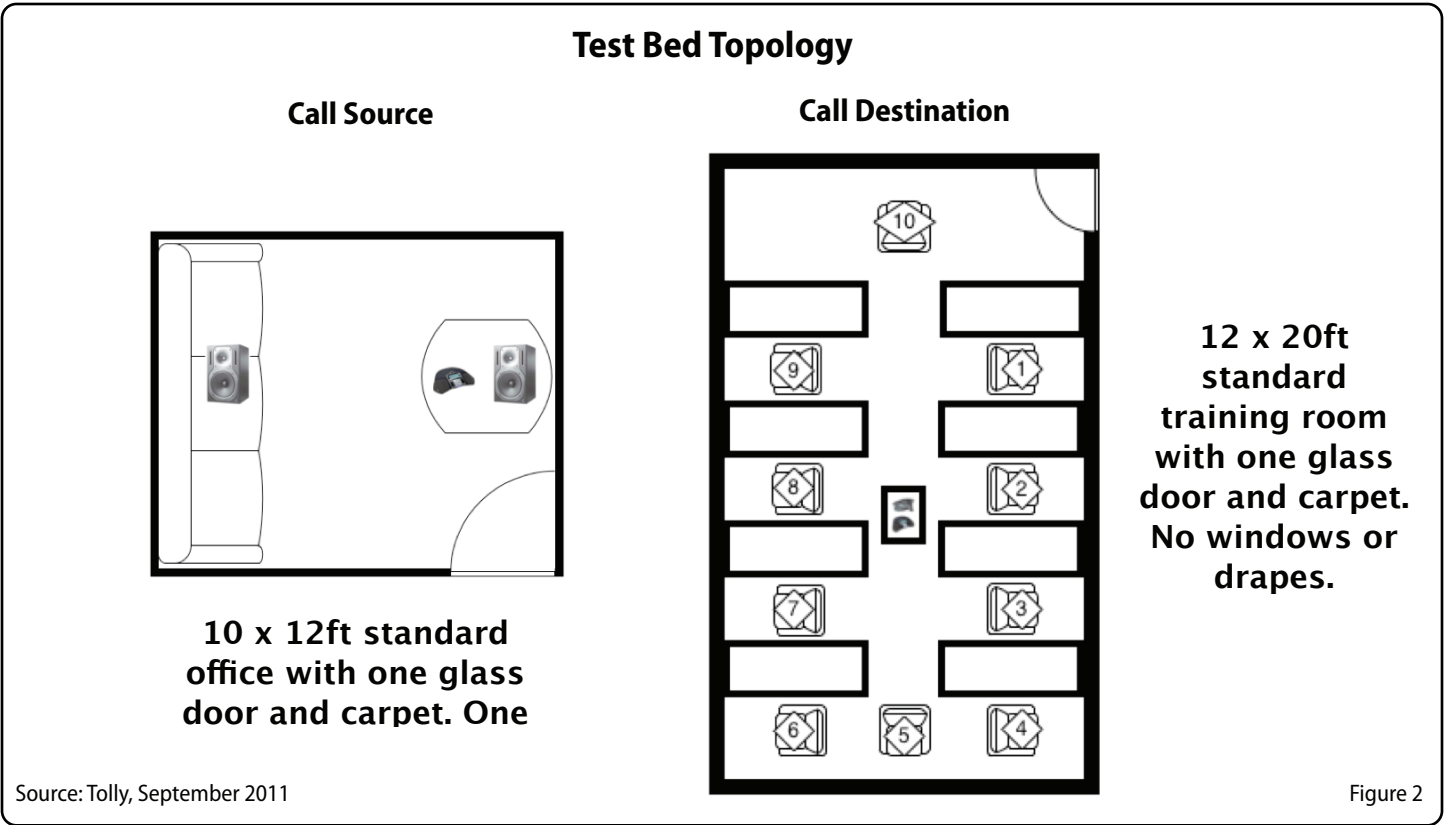
Voice Quality Test Profile

Test Element	Detail		Notes/Description
Duplex Mode	half-duplex		one person speaking at a time
Distance: Audio source to Phone	Call Audio	Close: 1.5 ft Far: 7 ft	All tests were run within the range limits listed for the phone under test. Extension microphones not used. Output volume on speakerphone was set to be identical and was not at maximum level.
	Noise	7 ft (when present)	
Audio Source	Monitor speaker		One Behringer TRUTH B2031A High Resolution Reference Monitor (configured with typical settings) was used for the audio playback and another identical monitor for noise playback
Audio Content	ITU Content. Voices and noise files generated by the ITU and available to the general public		Files can be downloaded from: http://www.itu.int/net/itu-t/sigdb/genaudio/AudioForm-g.aspx?val=10000501
Testers	Office workers		Test participants were not audio experts trained to detect performance at various frequency ranges. They were workers who would actually use speaker phones.

Note: Please see Test Bed Topology diagram for details of the rooms used for the test.

Source: Tolly, September 2011

Table 2



Source: Tolly, September 2011

Public Address System

For large-scale, “all-hands” meetings, it might be necessary to include more participants than can physically fit into even the largest conference room.

To address such occasions both the Avaya B159 and B179 provide means for the conference phone to be connected to a public address (PA) system.¹

Test Setup & Methodology

Test Environment

The sound quality study was performed in one sending room (10 x 12 ft² standard

office room with 1 glass door) and one receiving room (12 x 20 ft² training class room with 1 glass door). See Figure 2 for layout.

Two American English male sentences and two American English female sentences were used as the voice signal. Street noise was used as the background noise, always played from the further speaker. All signals were from the International Telecommunication Union’s Telecommunication Standardization Sector (ITU-T) “P.501: Test signals for use in telephony”. Two high-end studio speakers (1.5 feet and 7 feet away from the conference phone) were used to replicate the test audio in the sending room.

According to ITU-T P.800: For methods for objective and subjective assessment of

voice quality, participants should be chosen at random from a population which has not been directly involved in work connected with assessment of the performance of telephone circuits, or related work such as speech coding; and have not participated in any subjective test whatever for at least the previous six months. All 36 participants in this test were office workers and had no audio evaluation experience.

Conference Phone Voice Quality Test

The voice quality evaluation was divided into two separate scenarios, independently evaluating the microphone and

¹ Because of logistical constraints, the PA system connectivity feature was not tested by Tolly.



speakerphone quality of each pair of conference phones.

For the microphone quality test, one Polycom SoundStation2 conference phone was used as a common phone in the receiving room.

After initiating a call from the common phone to both phones under test (using a phone line splitter), engineers randomly muted one of the phones in the sending room to select the phone under test. One Tolly engineer played the same audio in the sending room using one Avaya conference phone and one Polycom conference phone back to back. No extension microphones were used.

For the speakerphone quality test, the common phone was placed in the sending room, with the pair of test phones in the receiving room.

A Polycom SoundStation2 conference phone was used as the common phone for two groups of participants. For another two groups, one Avaya B149 conference phone was used in the sending room.

During each test, Tolly engineers played the same audio from the sending room and used one Polycom conference phone and one Avaya conference phone to receive the calls, playing them back to back. The speaker volume of all phones were calibrated to the same level before testing using a decibel meter. Engineers noted that

Polycom's maximum speaker volume was higher than that of Avaya.

Participants in the receiving room were asked to compare the two phones with a score 1 - 7, a rating of 1 corresponding to phone A being much higher quality and a rating of 7 corresponding to phone B. (See Figure 3.) Tolly engineers randomly selected an Avaya or Polycom as phone A to ensure there would be no discernible pattern in the test administration.

Four scenarios were evaluated for each phone pair: 1. Speech from a close position without noise; 2. Speech from a close position with background noise; 3. Speech from a far away position without noise; 4. Speech from a far away position with background noise.

Speech from a close position was simulated by playing the voice signal from Speaker X (1.5 feet away from the phone). Voice from a far away position was simulated by playing the voice signal from Speaker Y (7 feet away from the phone). Background noise was always played by Speaker Y when needed. The results from these tests were combined for each conference phone to arrive at the data reported in Figure 1.

To verify the bidirectional audio capabilities of the conference phones. Engineers initiated a call to each conference phone from a cell phone. One engineer would then read a paragraph, and another would

interrupt at a random time. If the speaking engineer could hear the interruption, the phone passed.

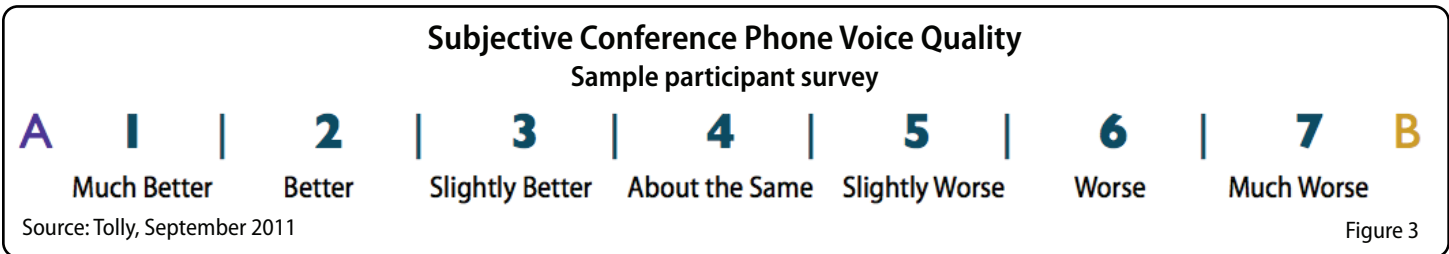
Feature Evaluation

The connectivity options of each phone were evaluated based on the Vendor's datasheet, and omitted where not applicable. For the mobile phone and USB VoIP connectivity, Engineers attached a mobile phone to the conference phone via a supplied cable, and to a laptop, ensuring that in both cases the conference phone could be used as both the speaker and microphone.

For the PA system connectivity, no compatible units were available in Tolly's lab, instead the verification relied on publicly available details about its integration with such a system².

Polycom Comments

Polycom recommended more extensive testing to include: formal MOS testing, testing at greater distances from the speaker phone (i.e. larger rooms) and full-duplex voice quality noting that these tests would provide more information on room coverage and echo cancellation. Polycom notes that they believe such tests are needed for completeness and to represent real-world performance accurately. The additional tests requested by Polycom were beyond the scope of this project.



² <http://support.avaya.com/css/P8/documents/100140921>



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You can reach the company by email at sales@tolly.com, or by telephone at +1 561.391.5610.

Visit Tolly on the Internet at:
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Interaction with Competitors

In accordance with Tolly's Fair Testing Charter, Tolly personnel invited Polycom to review the test plan and results. Polycom recommended additional testing that was beyond the scope of the current study. See body of report for additional Polycom comments.



For more information on the Tolly Fair Testing Charter, visit:
<http://www.tolly.com/FTC.aspx>

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