

ClearOne Communications RAV 600/900



RAV 900 teleconferencing system

Teleconferencing titan

Business requires sophisticated communication, and virtually every kind of communication technology has been adapted and enhanced to accommodate the business world. Teleconferencing has been practiced for decades, and the technology that enables it has become quite sophisticated. Until recently, however, a would-be purchaser of teleconferencing equipment had only two options— inexpensive lower-quality units or expensive high-end custom-installed systems. ClearOne Communications, Salt Lake City, has filled the middle niche with its RAV 600/900 audioconferencing systems. These are sophisticated systems that provide high-quality teleconferencing for a reasonable price.

COMPONENTS

The center of the RAV (pronounced “rave”) system is the rack-mountable audio mixer to which all other components—the mic pods, speakers, telephone lines, Ethernet, and an RF antenna—connect. The antenna enables communication with a controller interface. The audio mixer also features connections for recording, playback, external amplification, and voice tracking for the control of a motorized PTZ video camera for videoconferencing. Two internal 15W amplifiers drive the speakers, and Bose 161 Articulated Array speakers are included.

An included wireless RF controller for system operation during teleconferences allows the call leader to control user preferences and settings to various degrees and, most important, to manage calls. ClearOne deliberately chose to base this controller on a standard telephone keypad,

making it intuitive, regardless of a user’s technical aptitude. Its operational range extends to 50ft. from the audio mixer, more than enough for most applications.

The RAV system features mic pods (two with the RAV 600, three with the RAV 900). Each pod contains three mic elements that work in concert to provide 360-degree coverage. The pods are daisy-chained from the mixer with Cat-5 cables terminated with RJ-45 connectors. The pods feature a mute button and LED indicators that glow green when the pod is active and red when muted.

The pair of Bose 161 speakers provides aural output for the system, driven by the audio mixer’s internal 15W amplifiers. As with the Cat-5 for the mic pods, speaker cabling is included.

The final system component is the RAV-Ware software, which works on Windows systems and provides advanced system control. Although the system is intended to be completely functional out of the box, this software enables extended control over such things as speaker levels, equalization, and the levels of input and output devices. The user’s computer can interface with the audio mixer via USB, RS-232, or remotely via LAN.

MORE THAN MEETS THE EYE

The RAV system initially appears to simply be a connected mixer, controller, mics, and speakers. There is, however, some pretty high science at work. First, the system uses what ClearOne calls “adaptive modeling,” which actively “listens” for changes in the boardroom environment. Examples of such changes would be the cycling on and off of

the air conditioning system, the departure or arrival of meeting participants, and other significant acoustical events. It also monitors for the feedback that results from mic-to-speaker coupling. An algorithm based upon the ambient noise levels within the room adjusts the processing threshold of the adaptive modeling.

The second technology the RAV system exhibits is acoustical echo cancellation (AEC.) This prevents the speakers' audio from being picked up by the mic pods, thus eliminating the slap-back echo that would normally result. The three mic elements in each pod enable the system to build a precise model of the room's acoustics, enabling the system to cancel echoes. Without getting exceedingly technical, three distinct technologies are employed to accomplish this—sub-band method (similar to an FFT analysis), TX and RX correlation (compensates for anything that acoustically interferes with the echo-cancellation algorithm), and suppression techniques (subdue residual echo resulting from mismatches between the calculated room model and the actual room's acoustical environment). There's some pretty serious number-crunching going on to produce a clean, clear signal on the other end.

The third technology the RAV system employs lies in noise cancellation. This is essentially dynamic frequency-dependent gating. The system analyzes the room environment to establish what it considers broadband noise and then attenuates only the noise, allowing desired signals to pass.

Finally, the RAV system utilizes look-ahead gating. The system determines which of the mic elements (six in the RAV

600, nine in the RAV 900) best represents a particular speaker's voice. It increases the level of that element and attenuates the others, thus maximizing the level of that speaker while eliminating the comb filtering "swish" that normally accompanies multiple mics in proximity. The audio is imperceptibly delayed, allowing the algorithm enough time to compensate for and eliminate the artifacts associated with rapid gain change.

SYSTEM SETUP AND OPERATION

I found the RAV system easy to use right out of the box. I tested a RAV 600 system, and I was able to set it up and get it running in about 25 minutes, including installation of the RAV-Ware. A more professional and permanent installation (with tidier wiring) would take maybe another hour. My one paltry complaint concerns the location of the RJ-45 jacks on the mic pods, which makes connection a bit dodgy. Otherwise, operation is very simple using the wireless RF controller, which can be placed near anyone seated at the conference table. The RF controller enables only basic operations, such as establishing and disconnecting a call and storage of frequently called numbers in a phonebook. The RAV-Ware software enables much more sophisticated control over mic pod and speaker levels, equalization, and signal routing, along with all the TF controller's functions. It is even possible to equalize the line-out signal to optimize a recording of the conference or to equalize the input from an external source for inclusion in the conference.

CONCLUSION

The RAV 600/900 system is an excellent solution for any organization that requires high-quality teleconferencing. The quality of the audio on both ends is very clear and virtually noise-free, which is the first reason to consider it. The other reason I would recommend it is the deep control availed by the RAV-Ware software, which makes operation simple and straightforward. The RAV system truly does fill a middle-ground niche between inexpensive speakerphones and high-end custom systems. ■

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SPECIFICATIONS

Mic Pod

Frequency Response: 60Hz-14kHz (± 1 dB)
THD+N: <0.08% (-45dBu input at 1kHz)
Sensitivity: -45dBu
Input Level: +6dBu for 1kHz at 94dB SPL
Dynamic Range: >65dB

Line I/O

Connection: Unbalanced RCA
Gain: -10dBu nominal, adjustable from -14dB to +18dB
Nominal Input Level: -10dBu
Nominal Output Level: -10dBu, adjustable from -14dB to +18dB
Maximum Level: +9dBu
Impedance: >10k Ω
Output Frequency Response: 40Hz to 15kHz (± 1 dB)
Output Dynamic Range: >80dB
Output THD+N: <0.02% (+6dBu input at 1kHz)

Playback/Record I/O

Connection: Unbalanced RCA
Gain: -10dBu nominal, adjustable from -14dB to +18dB
Nominal Level: -10dBu
Maximum Level: +9dBu
Input Impedance: >10k Ω
Output Frequency Response: 40Hz to 15kHz (± 1 dB)
Output THD+N: <0.02% (+6dBu input at 1kHz)

Loudspeaker

Connection: Push terminals—left/right
Power: 10W
Impedance: 8 Ω
Frequency Response: 60Hz to 15kHz (± 1 dB)
Dynamic Range: >80dB
THD+N: <0.5% (+5dBu line input at 1kHz)
Output Level: 90dB SPL output at 1m

Mixer

AEC Tail Time: 128ms
Adaptive Noise Cancellation: (6dB to 18dB)
Gating: Adaptive ambient, first mic priority, look-ahead gating, NOM attenuation

Telephone Interface

Connection: RJ-11 (set and line jacks)
Tail Time: 30ms
Frequency Response: 250Hz to 3.3kHz (± 1 dB)
THD+N: <0.2% (+7dBu line input at 1kHz)
Dynamic Range: >60dB

PRODUCT SUMMARY

Company: ClearOne Communications;
www.clearone.com

Product: RAV 600/900

Pros: Ready to use right out of the box; sophisticated teleconferencing and noise-reduction technology.

Cons: Location of RJ-45 jacks on mic pods a little awkward.

Applications: Out-of-the-box teleconferencing for users with varying levels of technical sophistication.

Prices: \$2,599 (RAV 600);
\$3,099 (RAV 900)

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