



Position Statement on the use of Bluetooth and Smartphone-controlled Training Devices

Technology manufacturer Garmin recently announced a new training device, the Delta Smart, which allows a dog owner to control an e-collar through a smartphone app.

We believe this device has the potential to cause harm to dogs and should not be recommended by behavior consultants, trainers, or used by members of the public. This is because both Bluetooth and smartphones have the potential to introduce excessive latency. Latency is the delay between inputting something into a system, and the system's output.

Bluetooth is a packet-based transmission protocol, which is designed for data transfer, not for time-sensitive operation. The difficulties of time-sensitive operation are manifold, but they essentially stem from the fact that data packets may get lost in transmission and require retransmission. The receiver can decide a packet is lost only if it hasn't received it after a certain amount of time, at which point it must ask for a retransmission and hope for the best. This waiting around introduces an uncertainty in the time it takes for a message to be delivered (or, in this case, a "shock" operation to be interpreted by the collar).

This means that sometimes the message might get delivered right away, sometimes it might take more time, and sometimes it may not get there at all.

In areas of high interference, latency can vary up to the hundreds of milliseconds. Bluetooth uses the same spectrum as the overwhelming majority of Wi-Fi equipment, and high degrees of Bluetooth packet loss have been observed in Wi-Fi-congested areas. This means there is a higher chance of delay between the phone sending its signal and the collar receiving it, or of signals being missed entirely.

High latency translates to poor communication between dog and handler. Latency is also an issue with Internet-connected treat dispensers intended for positive reinforcement. We suggest only using these devices to train duration behaviors, which don't usually call for a high level of precision in the timing of reinforcer delivery.

The smartphone as an e-collar interface

Smartphones compound the problem because they are sources of latency for two reasons: human and technological.

On the human side, a touchscreen interface provides no tactile guidance to the user. In Garmin's Canine App, the user has to hit a thumb-sized button to shock the dog. The

probability of the user missing this button on the first attempt—particularly if they are looking at their dog, and not the screen—is not small.

Further, the product advertises "multi-dog capability." How this is implemented is not clear from the marketing material, but either there will be several shock buttons (for multiple dogs) in close proximity to each other, or nontrivial interactions will be needed to "switch" between dogs, so either shocking the wrong dog or taking several seconds to apply the shock, respectively, will be likely.

Capacitive touchscreens and event-response software stacks on smartphones display non-zero response times. Measurements in this area show latencies up to the 100ms range. This means that there is always a delay—up to a tenth of a second—between touching the screen and the screen registering that you have touched it. Then potentially even more delay as the app processes this event and sends the signal via Bluetooth to the dog's collar.

The biggest source of latency in any training situation always going to be the human themselves. On top of our natural reaction time (which increases as we age), there is the time required to observe, recognize and decide to punish the dog's behavior. Best practice requires trying to minimize the delay between a dog's behavior and the consequence for it, through engaged observation and practiced training mechanics. This is true for trainers using any methodology.

Using a tool designed to deliver an aversive stimulus, such as an e-collar, already has the potential to cause significant behavioral problems. Our [LIMA approach](#) strongly favors positive reinforcement.(1) IAABC concludes that this device and devices like it pose an unacceptable risk of creating unintended welfare and behavioral consequences.

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