

# Evaluating the Performance of Hand-held Cellphone Detectors in a Prison Setting

By Joe Russo

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In response to the major and growing problem of contraband cellphones,<sup>1</sup> correctional administrators have increasingly turned to technological solutions to prevent contraband cellphones from entering facilities and to detect them. These solutions are marketed to administrators who are eager to address this critical issue. Unfortunately, products are often introduced into the correctional environment without rigorous, independent testing in an operational setting. To address this problem, the National Institute of Justice funded an evaluation<sup>2</sup> of one particular solution: hand-held cellphone detectors through the Corrections Technology Center of Excellence, which is part of the National Law Enforcement and Corrections Technology Center system. Three different types of detection devices were evaluated: radio frequency detection (RFD) devices, nonlinear junction detec-

tor (NLJD) devices and ferromagnetic detection (FMD) devices.

Each device that was tested employs a unique technical approach and, as a result, is better suited for some search applications than others. While direct comparison between devices is not appropriate, some key themes did emerge during testing. RFD devices performed extremely well at long ranges (70 to 125 feet), detecting each cellphone while producing no false alarms. Correctional officers who participated in the study preferred these devices for their utility during cellblock patrols. It should be noted, however, that RFD devices are effective only when the phone is actively making a call. NLJD and, to a much lesser degree, FMD devices were better suited for, and performed well in, the cell search scenarios due to their limited detection range (0 to 7 inches and 1 to 8 inches, respectively). Officers expressed concern, however, with false-alarm rates. The NLJD device produced false alarms at a rate of 28 percent for nonelectronics to 33 percent for authorized electronics; the FMD produced false alarms at a rate of 38 percent (authorized electronics) to 76 percent (nonelectronics). It should be noted that these high rates result, in part, from the presence of a variety of electronic devices and metals in a typical inmate cell. The evaluation

produced evidence-based information that administrators can use to make cost-effective technology decisions based on their agencies' needs.

## The Study

For the evaluation, researchers defined hand-held cellphone detector devices as ones that weigh less than 8 pounds, are powered by batteries and are designed for single-person operation. The high-level goals of the evaluation were to determine the extent to which the devices could identify and locate a hidden cellphone, the time required to detect the contraband and the impact of false alarms.

The researchers tested four devices: two RFDs (PocketHound and WolfHound Pro), one NLJD (Orion 2.4) and one FMD (MantaRay). The Pennsylvania Department of Corrections provided a medium-security prison as a test site and officers from their search team to assist with testing. Officers were trained in the operation of each device, and a test plan was developed to evaluate the devices in three distinct settings: baseline testing, operational patrol testing and operational cell search, which were designed to align with the institution's normal procedures for each type of activity.

## Technology can provide a variety of tools to combat the contraband cellphone problem, each with possible strengths and limitations.

### Results of the Evaluation

Understanding the scientific principles underlying the technology solution and the inherent strengths and limitations of the approach are important to interpretation of the results. For example, RFD devices detect the radio signals emanating from a cellphone, while FMD devices detect the ferromagnetic components that are common within cellphones, and NLJD devices leverage the unique properties of semiconductors used in electronic products to detect cellphones. See the table below for a brief presentation of the strengths and limitations of the three technology solutions.

Because RFD devices are specifically designed to detect radio signals, they proved to be very useful in the detection of a cellphone that was “on” and mak-

ing an active call. Under these conditions, detection occurred at great distances (up to 125 feet), and directional indicators were very useful in helping the officer locate the cellphone. During the patrol scenarios, these devices consistently picked up an active call within four minutes of the time the officer entered the cellblock. Further, the RFD devices were 100-percent accurate with no false alarms. On the other hand, not surprisingly, the RFD provided no utility whatsoever if the cellphone was in the “off” position as no radio signals were emanating from the phone. When the cellphone is on but no call is being made (“on-passive”), the results are less clear due to the technology. A cellphone in on-passive or “standby” mode will periodically and briefly communicate with (or ping) cell towers. The RFD devices detected

this communication more often than not, but because its function is sporadic, no directional indication could be obtained, and location of the cellphone in this mode was virtually impossible. During the cell search scenario, the RFD devices performed equally well with the cellphone in the on position and making an active call. However, it may be questionable as to how effective this approach would be in an actual cell search, because inmates generally know when a search team is in the housing block and will quickly terminate a call and turn the cellphone off well before the team arrives.

Testing showed that the NLJD and FMD devices can detect cellphones in the on or off positions, which is an advantage; however, the operator must be in very close proximity to the phone (less than 8 inches). As these devices were not designed for patrol use, they were excluded from that test scenario. The NLJD device performed well at short range in the cell search scenario, with a true alarm rate of 94 percent regardless of the status of the cellphone. That said, false-alarm rates (alerts on items other than a cellphone include authorized electronics such as televisions, radios, etc.) were an

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**Table 1**

	Technology Solutions		
	FMD	NLJD	RFD
Able to detect phones in off mode	Yes	Yes	No
Able to detect phones in on/active mode	Yes	Yes	Yes
Detection range (phones on/active)	0-7 inches	1-8 inches	70 - 125 feet
Directional accuracy (phones on/active)	Poor	Good	Excellent

■ Excellent   
 ■ Good   
 ■ Poor

issue because of the way the technology operates. False-alarm rates ranged from 28 percent (nonelectronics) to 33 percent (authorized electronics). On average, officers detected the cellphone within seven minutes using the NLJD device. The FMD device detected cellphones at short range but also produced a large number of false positives. It did not perform nearly as well as the NLJD in testing, with a true-alarm rate of 56 percent. False-alarm rates ranged from 38 percent (authorized electronics) to 76 percent (nonelectronics). These results were not unexpected because the FMD device is not intended for cell searches, specifically because of all the metallic material in a cell; it is intended, instead, for personal searches.

### Search Team Feedback

After a 60-day use of all four devices following the formal testing, the officers overall preferred the RFD devices over the NLJD and FMD devices. The officers tended to dismiss the NLJD and FMD devices for two important reasons: frustration by the false alarms that these units generated (more so for the FMD than the NLJD) and the limited detection distance. Officers reported that they are trained to search items in a cell — and the cell itself — thoroughly, so they consider a detection device that operates at such a close range (8 inches or less) of little value because their thorough manual search would likely find the phone as quickly, or more quickly, than an electronic device would. The exception might be cases in which a cellphone is hidden in a hard-to-access place, such as within a cinderblock or inside a toilet.

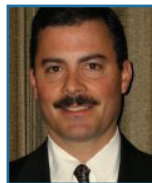
## Conclusion

Technology can provide a variety of tools to combat the contraband cellphone problem, each with possible strengths and limitations. Thus, corrections personnel are cautioned against making direct comparisons of products that use dissimilar approaches, such as the hand-held cellphone detection devices. However, correctional administrators would benefit from evaluation studies such as this that can provide them with evidence-based results on which to make effective technology selections to help solve agency problems. Results of this study show that hand-held cellphone detectors could contribute to solving the contraband cellphone problem, but are not the sole answer. A multilayered approach that includes sound policies, procedures, practices and proven technology solutions continues to be the recommended best practice for combatting contraband cellphones in correctional facilities.

### ENDNOTES

<sup>1</sup> Burke, T.W., and S.S. Owen. 2010. *Cell phones as prison contraband*. FBI. Retrieved from <https://leb.fbi.gov/2010/july/cell-phones-as-prison-contraband>.

<sup>2</sup> Shaffer, J., and J. Russo. 2015. *Test and evaluation of hand-held cell phone detection devices*. National Law Enforcement and Corrections Technology Center.



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