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Tech note

Determination of Location Accuracy in an Inovonics Mobile Duress System

Introduction

A properly installed Inovonics mobile duress system will deliver a high degree of indoor location accuracy in a commercial construction environment. In repeated tests, Inovonics achieved the right floor every time and the right room 90 percent of the time, with an adjacent room in the remaining 10 percent of cases.

This tech note details the procedure Inovonics followed to achieve this level of location accuracy. We prepared it for our mobile duress dealers to reference, and to provide guidance when conducting their own location accuracy testing.

Please contact Inovonics technical services or your account manager to ensure your testing takes into account any unique attributes or user needs for your specific application. See the *Inovonics Mobile Duress User Manual* for details about site set up, post-installation site testing, and hardware placement to achieve desired performance.

Contact Information

For questions, contact your account manager or Inovonics technical support:

- E-mail: support@inovonics.com.
- Phone: (800) 782-2709; (303) 939-9336.

Overview

The radio frequency (RF) propagation — or behavior — of a wireless technology is impacted by everything the waves travel through. Drywall, glass and wood usually let most signals pass through easily, but other construction materials, such as concrete or metal, may inhibit or attenuate the signal. Even furniture, people, vegetation and the moisture content of the air can have an impact.

Different wireless technologies have different strengths and weaknesses which make them more or less suited for given applications. For example, WiFi is a wonderful choice for sending large packets of data over a wide area, but sending these large data packets requires significant energy, resulting in a relatively short battery life.

The Inovonics mobile duress system takes advantage of two wireless technologies. The location itself is provided using Bluetooth to take advantage of its range limitations. This is then transmitted using the proprietary Inovonics EchoStream wireless technology, which provides the range, reliability and optimal battery life best suited for life safety applications.

Procedure

Inovonics used the following procedure to determine the location accuracy of our mobile duress system.

Note: To test and validate location determination accuracy, we strictly controlled activations for repeatability and to minimize variables.

1. Our first step was to use our office floor plan to install our EN5060 locator installations, as shown in Figure 1 and Figure 2.

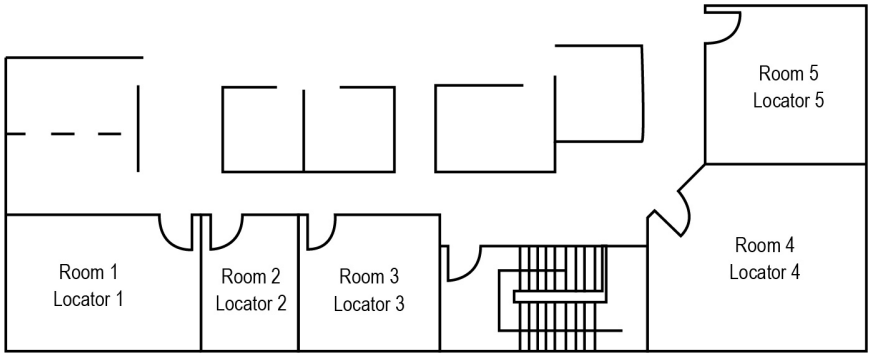

Figure 1 Second floor EN5060 locations

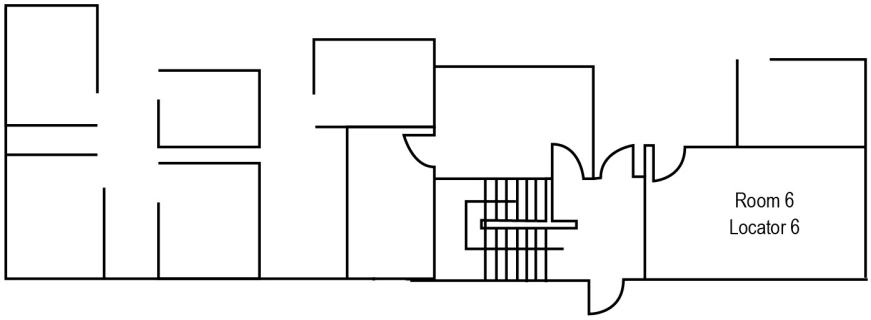

Figure 2 First floor EN5060 locations

2. Next we used our EN7017 survey kit and app to assist with gateway placement, and installed the EN7580 mobile duress gateway within range of the locators.

3. We registered the EN7580, the associated EN5060s and a mobile duress pendant into a test site created within the mobile duress application.

4. We then navigated to the locator testing feature in the mobile duress application.

5. With the locator testing feature open, we moved to the middle of the room where we installed the first locator.

6. Holding the pendant waist high with the back of the pendant facing the EN5060, we activated the pendant and waited in the

same position until the LED on the pendant flashed red, indicating a restoral message had been sent.

7. We repeated the activation five times to ensure an adequate sample.

8. We then activated the pendant in the following orientations, five times each:
   - With the EN5060 on our left.
   - With the EN5060 on our right.
   - With the EN5060 behind us.

9. We then repeated this procedure for each room, making sure to perform five activations for each orientation: front, left, right and behind.

Aggregate testing results

Using the test procedure outlined above, the Inovonics mobile duress system achieved a high degree of location accuracy.

Orientation Room Level	Facing		Left		Behind		Right		Total		Percentage	
	Correct	Adjacent	Correct	Adjacent	Correct	Adjacent	Correct	Adjacent	Correct	Adjacent	Correct	Adjacent
Room 1 Locator 1	5	0	4	1	2	3	5	0	16	4	80%	20%
Room 2 Locator 2	5	0	5	0	5	0	4	1	19	1	95%	5%
Room 3 Locator 3	5	0	5	0	4	1	5	0	19	1	95%	5%
Room 4 Locator 4	5	0	3	2	1	4	5	0	14	6	70%	30%
Room 5 Locator 5	5	0	5	0	5	0	5	0	20	0	100%	0%
Room 6 Locator 6	5	0	5	0	5	0	5	0	20	0	100%	0%
Total activations	30	0	27	3	22	8	29	1	108	12	90%	10%

Table 1: Room level testing results

As shown in Table 1, our five test activations per room and orientation yielded the correct room 90 percent of the time, with an adjacent room the remaining 10 percent of the time. If this were an actual site, installers would have the opportunity to refine locator placement or add more locators if the site were to require a higher degree of precision. For example, the locator in room 4 could be moved to a different outlet, or a second locator added, improving the results for the left and behind orientations.

Orientation Room Level	Facing		Left		Behind		Right		Total		Percentage	
	Correct	Above/ Below	Correct	Above/ Below	Correct	Above/ Below	Correct	Above/ Below	Correct	Above/ Below	Correct	Above/ Below
2nd, Room 4 Locator 4	5	0	5	0	5	0	5	0	20	0	100%	0%
2nd, Room 5 Locator 5	5	0	5	0	5	0	5	0	20	0	100%	0%
1st, Room 6 Locator 6	5	0	5	0	5	0	5	0	20	0	100%	0%

Table 2: Floor level testing results

We reviewed data for rooms 4, 5 and 6 where test activations had the opportunity to be heard by locators on the first and second floors. As shown in Table 2, our test activations per room and orientation yielded the correct floor 100 percent of the time. As with room level testing, if this were an actual site and results were unsatisfactory, there would be the opportunity to refine locator placement or add more locators.