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RESPONSE TIME STUDY OF ELECTRONIC DIRECT TO FIRE DEPARTMENT NOTIFICATION FOR

FIRE MONITORING TECHNOLOGIES INTERNATIONAL INC.

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October 31, 2014

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EXECUTIVE SUMMARY

Leber/Rubes Inc. was retained by Fire Monitoring Technologies International Inc. [FMTI] to conduct a study of response times for the reporting of fire alarms to the fire department communication centres. The Insurers Advisory Organization was also retained to monitor the testing procedures and review the results of the study. The purpose of the testing was to identify the time and reliability differences between standard central station monitoring and electronic direct to fire department notification (e-DTF). The system tested is known as OPEN ACCESS™ and is a trademark of Fire Monitoring Technologies International Inc.

Ninety-five tests were conducted during 12 days of testing in February and March, 2001. Twenty facilities utilizing OPEN ACCESS™ and 75 facilities utilizing central station monitoring only, were tested. The properties tested were identified as requiring fire alarm monitoring under the requirements of the Ontario Building Code. The report includes a statistical analysis of the results of the alarm testing program and provides conclusions based on a review of the statistics.

The response time calculations included the times for all activities required to dispatch the firefighters from the time of alarm activation to the time of vehicle dispatch.

All tests were conducted in cooperation with the local fire service. Of the 75 tests involving only a central monitoring facility, the fire alarm failed to operate in one facility and five alarm activations (6.8%)were not reported to the fire department. These incidents are recorded in the data but are not included in the final calculations.

A review of the data shows that electronic direct to fire department notification (OPEN ACCESS™) provides a faster average response of 114.7 seconds (1 minute 54.7 seconds) when compared to central station fire alarm monitoring. The average OPEN ACCESS™ alarm time was 30.1 seconds as compared to the average monitoring station time of 144.8 seconds (2 minutes 24.8 seconds). This represents a time savings of 481%. In other words, conventional central station monitoring took almost five times longer than electronic notification.
In addition, there were a number of incidents where errors were made by

the central station facility and 45 (60.8%) of the alarms reported through central station were not reported within 90 seconds. In virtually all cases, the fire trucks were dispatched through OPEN ACCESS™ before the fire department communication could be contacted by the central station.

Faster response times by the Fire Department will result in intervention earlier in the growth of the fire. The earlier the Fire Department is able to take action in a fire, the greater the opportunity to save lives and reduce property damage.

BACKGROUND

Electronic direct to Fire department notification known as "OPEN ACCESS™" was developed by Fire Monitoring Technologies International Inc. as part of a central fire communications project with the City of Mississauga Fire and Emergency Services.

OPEN ACCESS™ allows a fire alarm signal to be transmitted electronically to the fire department's computer aided dispatch system as it simultaneously reaches an alarm monitoring station. OPEN ACCESS™ is available to all companies operating ULC listed alarm monitoring stations.

The alarm signal received in the fire department communications centre is automatically directed to the Fire department computer aided dispatch computer. This interface allows the fire department to immediately dispatch emergency vehicles without having to interact with a central station operator.

Fire Monitoring Technologies International Inc. and the participating Fire Services believed that OPEN ACCESS™ provided superior and more reliable communications over connection to a monitoring station only. However, there was no hard data to determine what time savings may exist. This study was commissioned to determine through statistical analysis the differences in time and reliability between the use of OPEN ACCESS™ and the standard central station monitoring protocols.

The test data identifies the time of alarm activation, time of receipt of alarm at the communications centre via OPEN ACCESS™ (on systems where the OPEN ACCESS™ connections exist) or from a central station, and the time for communications centre staff to receive response information and notify emergency vehicles. These statistics are compared in this report.
A representative sample of 95 properties were selected at random from fire department property files in Mississauga and Brampton. All alarm tests were conducted with the assistance of fire service personnel and all times were documented through the fire department computer aided dispatch system.

The selection of facilities for testing was based upon requirements of the Building Code for facilities required to provide automatic notification to the fire department of a fire alarm signal. Buildings required to have monitoring of the fire alarm or sprinkler system as outlined in Article 3.2.2.17.

"Sprinklers in Lieu of Roof Rating" and Article 3.2.4.7. "Signals to Fire Department" were selected at random (see Appendix A).

Testing procedures were developed in cooperation with Mississauga Fire and Emergency Services and Insurers Advisory Organization (IAO). It was agreed that no property owner would be forced to participate in the testing program and that all tests would be documented through the fire department tape recording system and computer aided dispatch system (see Appendix B).
IAO conducted periodic audits of all testing. IAO personnel accompanied the testing team in the field and IAO personnel were positioned in the communications centre to monitor the receipt of alarms and the recording of times (see Appendix C).

The problem of unreported alarms was considered at the outset of the program. It was agreed that alarms that were not reported within ten minutes of initiation would be stopped. A time of ten minutes would be counted for the report of any alarm that was not reported to the fire department. It was presumed that a telephone call from the facility or adjacent property would most likely be received after ten minutes of activation of the facility alarm.

The testing team maintained radio contact with the communications centre. The test times identified included alarm activation time, time of receipt of alarm at the communications centre via OPEN ACCESS™ or central station monitoring, and time to receive response information and to notify emergency vehicles. All testing was to be suspended if the communications centre was involved in emergency operations that may be interrupted by the OPEN ACCESS™ response time testing study.

The assessment did not include an analysis of the alarm monitoring installations or installation compliance with recognized standards such as ULC or NFPA. It was assumed that the alarm monitoring installations were installed in compliance with the standards since the installations were required by the Building and Fire Codes and were installed by qualified companies.

ASSESSMENT REPORT

The alarm timed study testing was carried out over a period of two months. A total of 95 tests were conducted during 12 days of testing. Testing dates were selected at random during the months of February and March, 2001. A total of 95 alarm response tests were conducted in the City of Mississauga and the City of Brampton. Twenty tests included facilities utilizing the OPEN ACCESS™ direct to fire department alarm reporting system. The remaining 75 facilities were connected to a central station alarm monitoring company only.

The study data does not include the names of the alarm companies or the names and addresses of the facilities tested. The study was intended to provide a general industry survey and was not intended to identify the quality of service provided by any of the central station alarm monitoring companies (see Appendix D)

The average response time for receipt of alarms through the OPEN ACCESS™ system (all tests) was 27.2 seconds. When the tests that involved problems with software or local fire alarms (Test 2 and Test 52) are discounted, the average response time for OPEN ACCESS™ drops to 15.8 seconds. The average fire communications centre process time was 14.8 seconds for all OPEN ACCESS™ alarms. This time is reduced to 14.3 seconds when Test 2 and Test 52 are removed. The average total processing time for OPEN ACCESS™ reporting from alarm initiation to vehicle dispatch was 30.1 seconds.

The average report to communications centre time for the monitoring stations was 151.8 seconds (2 minutes, 31.8 seconds). The fire alarm failed to operate during Test 24. No reporting times could be recorded for the test. Five of the alarm initiations were never reported to the fire communications centre and were included in the calculations at 10 minutes. The premise for using a 10 minute timer was the expectation that building occupants or passers by would telephone the alarm to the fire department after 10 minutes. Tests 22, 31, 79, 84 and 93 were never reported to the fire department. The central station operators called the local premises prior to making the call to the fire department. In two cases, the operators were told that tests were being conducted, however, in three cases, they were told that the fire alarm was ringing but the cause was not determined. Two

of the facilities were occupied daycare centres, one was an occupied retail facility, one was a nightclub and one was a high risk industrial premise. The failure to report the alarm is contrary to accepted standards for the alarm industry. Chapter 5 of NFPA 72 "National Fire Alarm Code" 1999 requires that an alarm signal be immediately retransmitted to the fire department.

When the fire alarm failure and the five 'failed to reports' are discounted from the totals, the average reporting time to the communications centre by monitoring companies drops to 119.4 seconds (1 minute, 59.4 seconds). The average processing time for the communications centre when receiving telephone alarms from monitoring stations was 25.4 seconds.

The fire communications centre was able to process the OPEN ACCESS™ alarms faster because OPEN ACCESS™ is connected directly to the fire computer aided dispatch system (CAD). When an alarm is received, it is displayed on the call taker's computer screen. The display includes vehicle assignments and building information. The call taker can immediately send the alarm to the dispatcher. When a telephone alarm is received from a central station operator, the call taker must type the necessary information into the computer. This typing takes additional time and introduces the opportunity for error.

The average total response times for alarm processing (alarm initiation to fire truck dispatch) by central monitoring stations was 177.2 seconds (2 minutes, 57.2 seconds). When the 'failed to reports' are removed from the statistics, the average drops to 144.8 seconds (2 minutes, 24.8 seconds).

The difference in reporting time (alarm initiation to fire truck dispatch) between the monitoring station reporting times and OPEN ACCESS™ is 114.7 seconds (1 minute, 54.7 seconds). This is calculated by subtracting 30.1 seconds - total average response time for OPEN ACCESS™ alarms-from 144.8 seconds, the equivalent number for central monitoring stations. (see Appendix E).

During the testing, a variety of problems were encountered. Mississauga Fire and Emergency Services was installing a new computer aided dispatch system when the testing started. As a result, changes were being made to the OPEN ACCESS™ system software to ensure a proper interface with the new computer aided dispatch software.

During Test 14, the OPEN ACCESS™ system was taken off line prior to the beginning of testing by the field team. As a result, OPEN ACCESS™ was not available to report the alarm. The alarm monitoring company reported the alarm in 56 seconds, and the vehicles would have been dispatched in 1 minute, 26 seconds. This incident demonstrated the redundancy built into OPEN ACCESS™. When the system is not available, the central monitoring station will still report the emergency. Although there is a time delay compared to OPEN ACCESS™, this procedure provides a fail-safe backup. All of the OPEN ACCESS™ alarms were backed up by the central monitoring stations. In every case, the central station reported the alarm to the Fire Communications Centre. These reporting times were not included in the statistics because the fire dispatch communications centre would already have received and processed the incoming OPEN ACCESS™ signal. The central monitoring station call is a fail-safe procedure to verify that the alarm has been received. In almost every case, the fire trucks were dispatched before the verification call was received.

During Test 2, the field team encountered problems with the facility fire alarm system. It was necessary to conduct two tests since the auxiliary contact had been disconnected by a technician when he was bypassing the alarm circuits. The fire alarm was a computerized fire alarm and the system took considerable time to output the signal to the central station and OPEN ACCESS™. The property owner is investigating the fire alarm problems.

During Test 52, the OPEN ACCESS™ system took 2 minutes, 6 seconds to report. On the day of testing, technicians were working on the software interface for the central station to ensure proper output to the computer aided dispatch systems.

On five separate occasions, central station monitoring facilities failed to report alarms to the fire department. In Test 22, the central station operator telephoned the premises. The person answering the phone told the operator that the fire department was there conducting tests. The operator did not ask for identification from the person answering the telephone and did not contact the fire department. This incident was considered a 'fail to call' and the timer was stopped after 10 minutes.

During Test 31, the fire alarm was activated at a daycare centre. The central station operator telephoned the facility and spoke to the secretary for the church housing the daycare centre. The secretary stated that the alarm was

ringing but she did not know the cause. The secretary was not asked for identification. The fire department was not notified of the alarm. The timer was stopped after 10 minutes.

In Test 79, which was conducted in a large retail facility, the central station operator telephoned the store manager to tell him that there was a trouble signal for his fire alarm. The manager told the operator that the fire alarm was ringing and they were investigating but did not know the cause of the alarm and did not know whether they had a fire or not. The operator did not ask the store manager for any identification number. The fire department was not called. After 10 minutes, the timer was stopped. Upon further investigation, it was found that the central station alarm connection had been installed incorrectly and a fire alarm signal indicated a trouble signal while a trouble signal indicated a fire alarm to the central station.
During Test 84 at a daycare centre, the central station operator called the secretary for the church containing the daycare centre and asked if there was an emergency. The secretary said that the fire alarm was ringing, she did not know the cause and the staff were investigating. She was not asked for any identification number. The fire department was not called. After 10 minutes, the timer was stopped.

In Test 93 in a high risk warehouse and manufacturing facility, the central station operator called the premises. The person answering the telephone stated that the fire department was on site testing. Proper identification was not requested by the operator. The fire department was not notified. The timer was stopped after 10 minutes.

During Test 10 in a large secondary school, the central station operator called the school secretary. The operator was not aware that the facility was a school and told the secretary that they thought the property was a house. The secretary told the operator that the alarm was ringing but she did not know the cause. She told the operator to follow the standard procedures for the report of a fire alarm. The operator refused to call the fire department unless the school secretary provided her security identification number. The fire department received the call after 8 minutes and 48 seconds. The school is located three blocks from a fire station.

In Test 24, the fire alarm pull station that was activated did not operate the building fire alarm system. The test was stopped and the owner contacted his alarm maintenance contractor to inspect the fire alarm system and make the necessary repairs.

During Test 86, it took 10 minutes for the central station facility to notify the fire department of the alarm. The testing team was just proceeding to cancel the test when the alarm came in to the communications centre. In Test 91 at an elementary school, the central station operator gave the fire communications centre the wrong address for the school. The communications staff considered this address to be an actual incident and proceeded to begin dispatching emergency vehicles. Fortunately, the central station operator realized the mistake and informed the communications centre before the vehicles were sent out.

During the testing, a number of similar facilities were tested, with and without OPEN ACCESS™ alarm connections.

Three hospitals were tested. The one hospital with an OPEN ACCESS™ connection took 11 seconds from the time of alarm activation to receipt of alarm in the communications centre, and another 11 seconds for the dispatching of the fire trucks for a total of 22 seconds. The two hospitals without OPEN ACCESS™ had an average alarm reporting time of 3 minutes, 10.5 seconds and an average communication processing time of 46.5 seconds, for a total average time of 3 minutes, 57 seconds. The difference in alarm reporting time between OPEN ACCESS™ and the central station reporting for hospitals averaged 3 minutes, 35 seconds.
Tests were conducted in fifteen schools. One school was connected to OPEN ACCESS™ and the remaining fourteen were not. The alarm reporting time for the OPEN ACCESS™ monitored school was 10 seconds and the dispatcher processing time was 6 seconds for a total of 16 seconds. The average alarm reporting time for the schools with central station monitoring was 134.8 seconds (2 minutes, 14.8 seconds) and the dispatcher processing time averaged 21.9 seconds for a total of 156.7 seconds (2 minutes, 36.7 seconds). The response time difference between OPEN ACCESS™ and the central station monitoring for schools was 140.7 seconds (2 minutes, 20.7 seconds). It is also significant to note that on two occasions errors were made in the processing of the fire alarms at the central monitoring stations. During Test 10 there was a significant delay in reporting of the alarm to the fire department communication centre and during Test 91 the incorrect address was given to the fire communication centre.

Five tests were conducted involving nursing home or special care facilities. Two homes were connected to OPEN ACCESS™ and three were monitored to central station only. The average of the OPEN ACCESS™ alarm reports to the communication centre was 13.5 seconds and the communication dispatcher process time averaged 12 seconds for a total of 25.5 seconds. The central station monitoring reporting time averaged 92.7 seconds (1 minute, 32.7 seconds) and the communications operator processing time averaged 25 seconds for a total for 117.7 seconds (1 minute, 57.7 seconds). The difference in response time between OPEN ACCESS™ and central station monitoring was 92.2 seconds (1 minute, 32.2 seconds).

A review of the data shows that on almost every occasion involving OPEN ACCESS™ alarms, fire trucks would have been dispatched before the central station monitoring facility was able to contact the fire communication centre.

The Mississauga Fire and Emergency Services "2000 Response Statistics Summary" indicates that the average preparation time for firefighting crews (time from the receipt of dispatch to "on the road") is 76.8 seconds (1 minute, 16.8 seconds) and the average travel time from the closest fire station to the emergency is 222 seconds (3 minutes, 42 seconds). When these times are added to the OPEN ACCESS™ alarm times, the total average alarm times from alarm initiation to fire department on scene is 328.9 seconds (5 minutes, 28.9 seconds).

By comparison, the average time from alarm initiation to fire truck arrival, where central station monitoring is employed, is 443.6 seconds (7 minutes, 23.6 seconds).

The on scene time difference is 114.7 seconds (1 minute, 54.7 seconds). The fire growth curve (see Appendix F) illustrates that the sooner emergency service personnel intervene in a fire emergency, the less risk there is for building occupants and property safety.

CONCLUSIONS

1. There is a significantly faster overall response time for   e-DTF

Electronic direct to the fire department notification [e-DTF] provided a significantly faster average response time of 114.7 seconds [1 minute 54.7 seconds] when compared to conventional central station fire alarm monitoring. The average total process time for central stations was 144.8 seconds (2 minutes 24.8 seconds) as compared to 30.1 seconds for e-DTF. This represents a reduction in reporting and dispatch time of 481%.

2. There is reduced reporting time to the fire communications centre with e- DTF

The average reduction in alarm reporting time [i.e., from alarm activation to arrival of the information in the fire communications centre] from electronic notification was 103.6 seconds (1 minute, 43.6 seconds). This was demonstrated by comparing the average alarm reporting time of 15.8 seconds for e-DTF facilities served by OPEN ACCESS™ versus an average reporting of 119.4 seconds for facilities using only central station notification.

3. There is reduced fire communications centre processing time for e-DTF

The average reduction in processing time within the fire communications centre itself [i.e., time between arrival of information at the centre and dispatch of vehicles] from use of electronic notification was 11.1 seconds. This was demonstrated by comparing the average processing time of 14.3 seconds within the communications centre for e-DTF facilities on OPEN ACCESS™ versus an average time of 25.4 seconds for facilities using only central station notification.

4. Conventional alarm monitoring can be subject to delays and errors

Of the 74 tests of facilities monitored via conventional central station monitoring, 45 (60.8%) failed to report the alarm to the fire communications centre within 90 seconds. There were 30 (40.5%) alarms that took more than 2 minutes to report. Chapter 5 of NFPA 72 - "National Fire Alarm Code" 1999 requires that alarms be received at a central supervisory within a maximum of 90 seconds of activation of the alarm and that the alarm signal be retransmitted immediately to the fire department. Reporting time took as long as 10 minutes in some cases, and 5 (6.8%) of the tests were never reported to the fire communications centre. On other occasions, an excessive amount of time was lost due to the central station operator first calling the premises and not following protocol. On one occasion, the operator gave the wrong address for the alarm. These delays and errors can be avoided with electronic notification.

5. Hospitals and schools experienced greatest times savings from OPEN ACCESS™

Two categories of premises - hospitals and schools - demonstrated the greatest potential saving for OPEN ACCESS™. The differentials between the two types of notification were 3 minutes, 35 seconds for hospitals and 2 minutes, 20.7 seconds for schools, much greater than the 1 minute, 54.7 second average differential for the whole study. While the report did not examine the probable causes for these discrepancies, these variations from the norm should be cause for concern, especially due to the relatively vulnerable nature of their clientele.

6. The use of e-DTF does not eliminate the role of the alarm monitoring stations

Mississauga's model for direct electronic notification, which relies on the OPEN ACCESS™ gateway, connects existing fire alarm monitored facilities electronically to the fire communications centre's computers via the central station's automation system. This is achieved with software modifications to each central station automation system, and some changes with the fire communications centre itself. In the e-DTF environment, the alarm monitoring station remains a critical part of the loop, but its role

changes from that of making the first call to notify the fire department communications centre of a potential fire situation, to one of calling the communications centre to ensure that the electronic signal has been received. In the tests where the electronic signal was off line or delayed due to system software upgrades taking place on-line, the system was fail safed by the central station, which called the alarm in to the communications centre in the conventional manner.

7. e-DTF time savings can have a significant potential impact on municipal infrastructure

In order for the City of Mississauga to reduce its response time by an additional 114.7 seconds without the benefit of e-DTF, it would be necessary to reduce vehicle travel time by that same amount. In Mississauga the average vehicle travel time for all alarms is 222 seconds (3 minutes 42 seconds), and reducing this by 114.7 seconds would yield an average travel time of 107.3 seconds (1 minute, 47.3 seconds). In order to achieve a response time reduction of this magnitude, the city would require an additional 15-18 fire stations and the relocation of many of the existing stations. The capital cost for construction and equipment purchases would approach 50 million dollars. The annual cost of staffing approximately 18 additional fire stations would be in the range of 25 to 30 million dollars per year. e-DTF provides a much simpler and more cost effective way to achieve significant reduction in fire response times.

DATA SUMMARY CHARTS
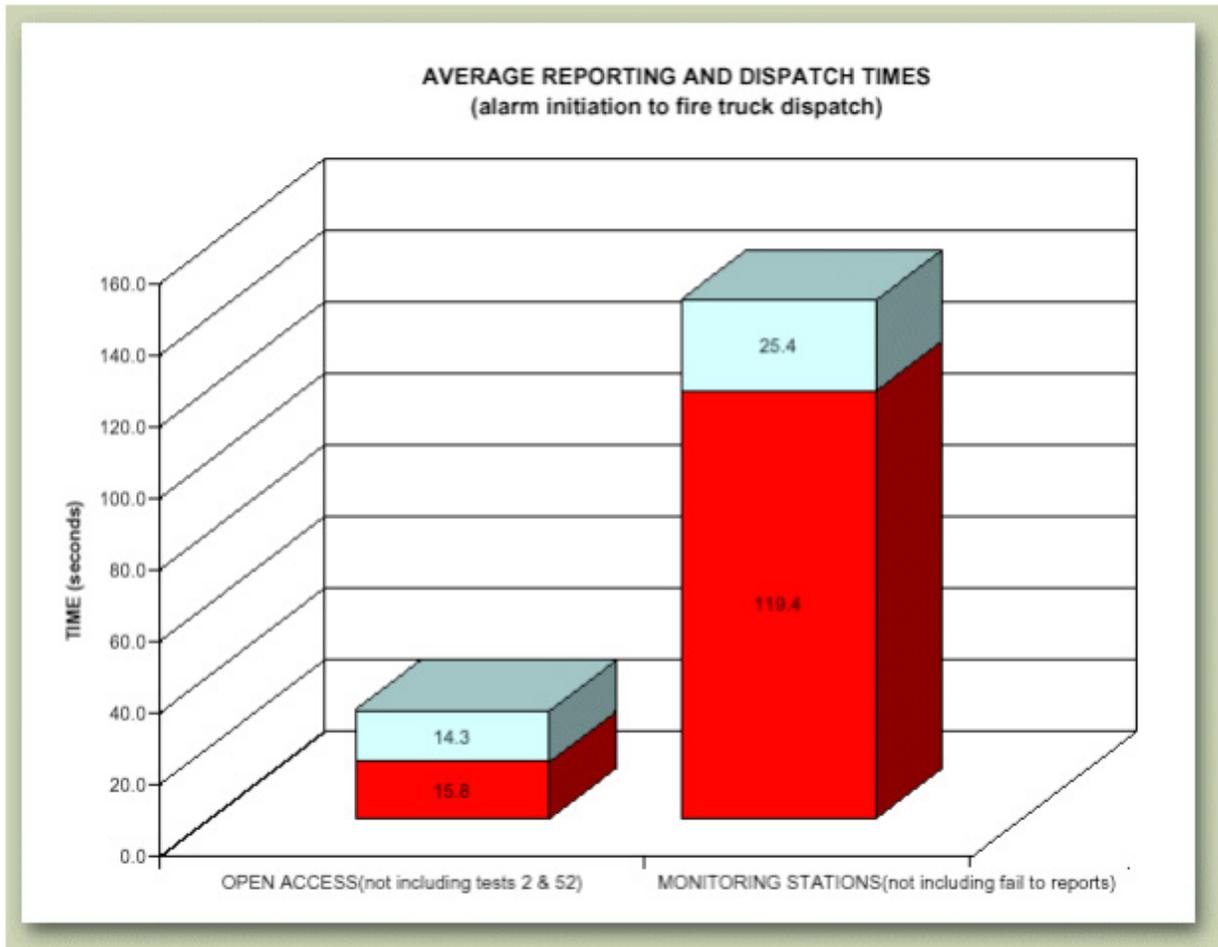
AVERAGE REPORTING AND DISPATCH TIMES
(alarm initiation to fire truck dispatch)

DISTRIBUTION OF TOTAL REPORTING TIMES
(alarm initiation to fire truck dispatch)