Review of Fire Dispatch for the Capital Regional District

Planetworks Consulting Corporation

April 2011
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1. Executive Summary

The Capital Regional District currently has three 9-1-1 centres and four fire dispatch providers only three of which are part of this study\(^1\). Over time, the number of 9-1-1 centres was much larger but these have gradually been reduced to the current number of providers. Further changes are sure to present, moving forward, and the role of the CRD in this change needs to be examined.

At the same time, 9-1-1 centres are facing additional pressures from increased calls, particularly from cellular phones as well as a reduction in revenue which is currently tied to the number of wire line phones in the region. In addition, a next generation of 9-1-1 is being considered to cope with IP based telephone systems as well as emerging issues such as texting, streaming video and others.

The three fire dispatch providers operate using different technologies and at the present time lack an integrated fail-over or disaster recovery model for all centres within the region. Two of the three have localized backup solutions, while a third has a full backup solution with a fire dispatch provider in Metro Vancouver.

The fire dispatch providers also face some technology changes including the implementation of wireless phase 2 and the potential for an electronic interface from the BCAS centre for more effective management of first responder calls. At the present time, two of the three dispatch centres have implemented the interface from BCAS.

Currently each of the fire dispatch providers is performing somewhat differently and not meeting the current external standard of service however each is generally within the range of other benchmark fire dispatch providers. At the present time the fire dispatch providers do not have identical workflows or technologies which may account for some of the differences in their performance. For this reason the comparison of dispatch performance should be considered with some care. At some point in the future one goal will be to establish within the CRD agreed performance metrics that will support directly comparable benchmarks.

The issue of performance standards for fire dispatch and for 9-1-1 also needs to be understood as recent concepts, and ones whose performance standards are being continuously reviewed. The performance criteria for fire dispatching are relatively new and have recently been modified as of the 2010 edition of the standard. When compliance with the standard in the CRD is compared with similar agencies, it can be shown that few fire dispatch providers have achieved 100% compliance at the present time. That said, most are making major improvements to their training, technology and management and are achieving better results.

As contracts for fire dispatch are renewed a number of issues should be addressed, including an agreed level of service based on the metrics recommended by the NFPA along with reporting milestones and a user committee that can more immediately deal with issues arising.

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\(^1\) The fire dispatch at the DND was not reviewed.
Looking forward the CRD will require a plan for the modernization of its 9-1-1 system to cope with the next generation 9-1-1 design which is still in the process of being defined. It is also recommended that the CRD consider amending its contracts/MoU's for the provision of service to include a more active user committee representing all stakeholders as well as performance standards with reporting metrics. Given the degree of consolidation that is occurring within the province, the CRD may also wish to consider marketing its services to other areas that may not be in a position to implement next-generation solutions and practices.

In terms of fire dispatch there are a number of options including reducing the number of dispatch providers from three, to two or possibly a single provider. Opting for two fire dispatch providers, coupled with load balancing to achieve reasonably equal call volumes would result in two centres, each with two dispatchers on duty. These centres could then provide a hot backup service for each other. This option would require a change in technology for the departments which ‘lost’ its fire dispatch service; there could also be labour relations issues however there would likely be no loss of dispatch staff overall.

A second option would be to implement a single fire dispatch provider for the entire CRD. This option is more complex and would require a major change of CAD and RMS technologies for one of the two centres. This could require a significant capital investment which may be offset in the long term by the option to operate with three dispatchers instead of the existing four dispatchers. In addition to the cost of the technology change there would be labour relations issues to consider and in this case potentially there could be an overall reduction of dispatchers on duty from the current total of four to three.

It should be noted that the staff and managers for each of the three fire dispatch providers were very focussed on the response objectives required, and are to be complimented for their general improvement over the time the study was conducted. In addition, during our site visits staff were totally candid in their discussions regarding the work to be performed and without exception had a correct view of their work and its relationship to public safety.

This document is supported by three technical memos (TM01B, TM01B and TM03B) that provide a more complete assessment of the situation analysis for each of the three dispatch centres; the standards of service and current developments and benchmarking. These provide more detail regarding each of three issues and should be considered as part of this summary report.
2. Introduction

The provision of 9-1-1 services in the Capital Regional District (CRD) is provided by the authority of Bylaw #2468—a Bylaw to Establish an Extended Service of Emergency Response within the Capital Regional District. The CRD is clear that the scope of 9-1-1 is limited to the time period between when a call is first answered until it is transferred to police, ambulance or fire dispatch.

There are currently three 9-1-1 Public Safety Answering Points (PSAP’s) in the CRD, at Victoria, Saanich and Langford where they are managed under contract by Victoria Police, Saanich Police and the West Shore RCMP. Currently, the only 911 service delivery contract with the CRD, is that with the West Shore RCMP, although all 911 Call Answer in the region, is within the responsibility of the CRD.

There are four fire dispatch providers in the CRD, specifically the Department of National Defence (DND) as well as the Victoria, Saanich and Langford Fire Departments. In this regard the CRD’s contracts directly with the City of Langford for the provision of dispatch for a number of fire departments\(^2\) and this contract expires in August 2011. Currently, Saanich has contracts with Oak Bay, Esquimalt, Central Saanich, Sidney and North Saanich. Victoria dispatches its own department, with no other clients. The DND fire dispatch was not a part of this study.

In February 2010 the CRD issued an RFP for the review of 9-1-1 services and fire dispatch. The fire dispatch review was in partnership with the Greater Victoria Fire Chiefs’ Association. The scope of work includes a review of the existing systems, an evaluation of current and future technology as well as a comparison to benchmark service providers and the prevailing standards of service.

2.1. Fire Dispatch Review Scope

- Consultant will make site visits to all Fire Dispatch facilities within the Capital Regional District.
- These visits should include on-site observations at each centre and interviews with management staff, dispatch supervisors, information technology staff, and a representative sampling of dispatchers.
- The consultant will interview management staff of current fire dispatch service providers and fire dispatch end users clients of each dispatch agency to ensure thorough understanding of the dispatch services provided and the challenges faced by end user clients under their respective dispatch service delivery model.
- The consultant will conduct a detailed evaluation and assessment of each of the current fire dispatch operations within the Capital Region.
- Consultant will provide thorough data analyses of current fire dispatch operations.

\(^2\) The current fire dispatch contract is for Langford, View Royal, Metchosin, Highlands, Sooke, Colwood and the electoral areas of Juan de Fuca, Salt Spring Island and the Southern Gulf Islands.
- The above assumes willingness by all involved entities to provide the requested information.
- Consultant will provide a complete systems inventory of technology used by each of the current fire dispatch providers, along with the capital and operational costs.
- Consultant will identify relevant data available to be shared among agencies, along with recommendations for data linkage mechanisms to accomplish this.
- The report will include assessment findings and recommendations on potential fire dispatch service delivery models.
- The consultant report would include transition plan recommendations for each of the potential service delivery models.
- The consultant will identify a recommended fire dispatch service delivery model best suited to meeting the fire dispatch needs within the Capital Region and will identify any adverse impact should one or more Fire Departments within the CRD choose not to participate.
3. Fire Dispatch

The following sections describe the review of the fire dispatch facilities hosted by the Victoria, Saanich and Langford fire departments. Victoria provides dispatch for itself while Saanich and Langford each provide contract dispatch service for a number of fire departments as follows:

- Victoria
  - Victoria
- Saanich
  - Saanich, Oak Bay, Esquimalt, Sidney, North Saanich, Central Saanich
- Langford
  - Langford, Colwood, View Royal, East Sooke, Highlands, Mayne Island, Metchosin, North Galiano, Otter Point, Pender Island, Piers Island, Port Renfrew, Salt Spring Island, Saturna Island, Shirley, Sooke, South Galiano, Willis Point

The service provided to the dispatch clients was measured by a survey that entailed a written response. The survey is shown in the appendix and the summary of the comments is provided for the two departments that currently have dispatch clients.

It should be noted in the following sections that the three dispatch facilities will be described in a great deal of detail with a number of recommendations for improvements. The discussion will include the technology as well as the dispatch staff, based on observations, other reference material submitted and analysis of dispatch data. In every case that the dispatchers have been observed they appear to function at a high level of professionalism with a clear view of the work objectives.

3.1. Standard of Service

The standard for fire dispatch performance is defined by the National Fire Prevention Association (NFPA) and the standard is titled ‘Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems—2010’. The most recent iteration of the standard was issued in mid-2009.

The standard is reviewed in detail in TM 02B\(^3\) and it should be noted that it is not mandatory in Canada but has been adopted by service providers and is referenced in a number of fire dispatch contracts in British Columbia and elsewhere.

The 2010 standard has the following response time objectives in section 7.4:

\[
\text{Ninety-five percent of alarms received on emergency lines shall be answered within 15 seconds, and 99 percent of alarms shall be answered within 40 seconds.}
\]

\(^3\) The 1221 Standard, like all NFPA standards, is achieved by consensus and in this particular case represents the agreed position of dispatch managers, the International Association of Fire Chiefs, insurance providers, technology providers, etc.
Ninety percent of emergency alarm processing shall be completed within 60 seconds, and 99 percent of alarm processing shall be completed within 90 seconds.

These call handling standards are part of an overall response model that has been agreed by the fire service in North America. The objective is to parse all activities from the time a 9-1-1 call is placed until arrival of apparatus (the complete client response envelope) and can be displayed in the following diagram.

Figure 1: NFPA Model for management of 9-1-1 and fire dispatch

The first half of the model identifies 9-1-1 and dispatch; the second part of the model identifies turnout and travel time. The latter two are taken from NFPA standard 1710 and the two standards are often viewed together in the sense of providing a total response objective.

The detailed call model from the 1221 standard is shown in Figure 1 and this illustrates four key processes:

1. The time to place a call to 9-1-1 and to have it successfully ‘down-streamed’ to the fire department (30 seconds)
2. The time to pick up, or answer the call reporting an emergency (15 seconds).
3. The time to interrogate the caller, determine the emergency, create a ‘dispatchable’ event in the CAD system and alert crews (60 seconds).
4. The time for responders to ‘turnout’ from the fire hall and begin their response to the scene (60 seconds for EMS calls, 80 seconds for fires).\(^4\)

\(^4\) This standard to turn out from the fire hall applies only to career units, i.e., ones that have their staffing complement ‘on duty’ at the time call is received.
The objective then is to complete the call taking and dispatch processes as quickly and efficiently as possible, as they are gating processes for the turnout and arrival of fire suppression crews.

### 3.2. Langford

#### 3.2.1. Facility

The Langford fire dispatch facility is located at hall #1 at 2625 Peat Road (Figure 2). The dispatch facility is located immediately to the right of the main door to the fire hall. The overall impression of the dispatch facility is that it is roomy and reasonably contemporary. In terms of issues to be considered are the relatively low level of security and the lack of sit-to-stand workstations.

![Figure 2: Langford Hall 1](image)

#### 3.2.2. Technology

The Langford Fire Department dispatch technology utilizes appropriate technologies and in terms of the NFPA 1221 standard it would be the second most compliant fire dispatch facility in the CRD. A much more detailed review of the technologies and the dispatch facility can be found in TM01B.

- **CAD**

  Langford uses a CAD and RMS provided by FDM Software of North Vancouver. This CAD replaced an earlier dispatch application in 2008 and is at or near the most current version of the software. The CAD supports mobile workstations and has recently implemented an interface with BCAS. The CAD is hosted locally and utilizes a mirrored laptop to provide dispatch...
capability from another location, should the main dispatch facility become untenable. The CAD system utilized by Langford, like the Intergraph solution used by Saanich, is technically compliant.

- **Mobile Workstations**

  Langford has implemented mobile workstations with its CAD, using devices provided by Acura Embedded Systems. The dispatch information includes mapping and operates using commercial wireless providers. The mobile workstation units are also GPS capable and can be tracked.

- **Phones**

  Langford uses two phone systems, one for non-emergency and one for emergency calls. Both are Nortel units and are described in greater detail in TM 01B.

- **Radio**

  Langford like other departments in the CRD utilizes the CREST radio system. Langford has retained the Zetron control console for this purpose and has not implemented the upgraded Motorola Gold Elite.

- **Voice Logging**

  The voice logging equipment is contemporary and call check recorders are provided for the dispatchers.

- **Power**

  Backup power is provided using a combination of diesel generator with a full UPS. This unit is located at the rear of the fire hall and is regularly tested. In addition there is a secondary stand-alone generator strictly dedicated for the alarm room power should the full diesel and UPS fail. This is located on the Apparatus floor of Station 1. There is a plan to tie this into the panel of the alarm room for another cut over option.

- **Consoles**

  The dispatch consoles are fully functional. At some point there should be consideration to upgrading these to sit-to-stand workstations that provide a better ergonomic environment for dispatchers.

### 3.2.3. Staff

The Langford dispatch is staffed with one dispatcher per shift. The dispatchers are dedicated to the dispatch facility with relief being provided by a qualified dispatcher or the Assistant Chief responsible for the division. Fire dispatchers have a specific training and mentoring program and the dispatch facility reports to an Assistant Chief.
Dispatchers are paid at a rate of 75% of a first class fire fighter however this is being adjusted upward in increments and will reach 90% by 2013. They work 42 hours per week averaged over 8 weeks with two 12 hour day shifts followed by two 12 hour night shifts. Dispatchers are supervised by an Assistant Chief and the allocation of his time for this purpose is approximately 60%.

The dispatchers are covered by the collective agreement between Local 2848 of the IAFF and the City of Langford. The current collective agreement expires in 2015 and labour relations are described as good.

3.2.4. Business Continuity

Langford has a plan for business continuity which is based on relocating staff from the current site with a mirrored laptop to provide dispatch service. At one time there had been consideration of a fail-over capability with Saanich but that has not yet been completed.

3.2.5. Call Management

The analysis is based on 8,754 incidents between February 29, 2008 and August, 2010 which is the period of time since Langford transitioned to an FDM CAD system\(^5\). The data set provided, contained information for the following elements:

- Callers name, phone number and address;
- Time and date of the first call;
- The first tone time;
- First acknowledged, first on route, first on scene, first cleared scene and incident type; and
- Incident address, fire department responding, apparatus.

The call processing time mandated by the NFPA 1221 standard for fire dispatch is 60 seconds 90% of the time. The data set was reviewed and the dispatch interval was calculated as follows:

\[
\text{Dispatch Time} = \text{First Tone Time} - \text{Time of the First Call}.\]

The data was also reviewed for call volume by day of the week and hour of the day.

Calls by day of the week

Analysis of the calls dispatched by day of the week display a distribution that is typical of most fire services with a peak of calls at the end of the week. The data is shown in the Table 1, with Saturday being the busiest day of the week, approximately 28% busier than the slowest day which is Tuesday.

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\(^5\) Prior to this time Langford operated on a system provided by Municipal Software.
### Langford Fire Dispatch, calls by Day of the Week

<table>
<thead>
<tr>
<th>Day</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
<td>1,294</td>
</tr>
<tr>
<td>Monday</td>
<td>1,299</td>
</tr>
<tr>
<td>Tuesday</td>
<td>1,184</td>
</tr>
<tr>
<td>Wednesday</td>
<td>1,227</td>
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<tr>
<td>Thursday</td>
<td>1,173</td>
</tr>
<tr>
<td>Friday</td>
<td>1,229</td>
</tr>
<tr>
<td>Saturday</td>
<td>1,348</td>
</tr>
</tbody>
</table>

**Table 1: Langford Fire Dispatch, calls by Day of the Week**

This information can be graphed as follows.

![Langford Dispatch: Calls by DOW](image)

**Figure 3: Langford Calls by Day of the Week**

**Calls by the hour of the day**

Calls dispatched by hour of the day are shown in the Table 2 and once again this is fairly typical of a fire dispatch centre. The busiest hour is from 1700 to 1800 hours; the slowest hour is from 0400 to 0500 hours. In this case the range of calls is much more dramatic with the increase being more than 400%.

<table>
<thead>
<tr>
<th>Hour</th>
<th>Count</th>
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</thead>
<tbody>
<tr>
<td>0000 hours</td>
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<tr>
<td>0100 hours</td>
<td>198</td>
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<tr>
<td>0400 hours</td>
<td>117</td>
</tr>
<tr>
<td>0500 hours</td>
<td>137</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hour</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0600 hours</td>
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<td>0700 hours</td>
<td>276</td>
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<tr>
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<td>406</td>
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<tr>
<td>0900 hours</td>
<td>460</td>
</tr>
<tr>
<td>1000 hours</td>
<td>467</td>
</tr>
<tr>
<td>1100 hours</td>
<td>498</td>
</tr>
</tbody>
</table>

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The ability to dispatch calls within 60 seconds 90% of the time is the standard outlined by the NFPA. The standard however mandates that the 90th percentile and other statistics be calculated on a monthly basis which is shown in the Table 3.

<table>
<thead>
<tr>
<th>Month</th>
<th>90th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar-08</td>
<td>00:03:05</td>
</tr>
<tr>
<td>Apr-08</td>
<td>00:02:37</td>
</tr>
<tr>
<td>May-08</td>
<td>00:03:13</td>
</tr>
<tr>
<td>Jun-08</td>
<td>00:02:54</td>
</tr>
<tr>
<td>Jul-08</td>
<td>00:02:50</td>
</tr>
<tr>
<td>Aug-08</td>
<td>00:03:01</td>
</tr>
<tr>
<td>Sep-08</td>
<td>00:02:29</td>
</tr>
<tr>
<td>Oct-08</td>
<td>00:02:21</td>
</tr>
<tr>
<td>Nov-08</td>
<td>00:02:19</td>
</tr>
<tr>
<td>Dec-08</td>
<td>00:02:12</td>
</tr>
<tr>
<td>Jan-09</td>
<td>00:01:46</td>
</tr>
<tr>
<td>Feb-09</td>
<td>00:01:30</td>
</tr>
<tr>
<td>Mar-09</td>
<td>00:01:48</td>
</tr>
<tr>
<td>Apr-09</td>
<td>00:02:02</td>
</tr>
</tbody>
</table>
What is apparent from this table is that Langford’s success in meeting the 90th percentile has been consistently improving since the first month with the new CAD system. This is better illustrated in the graph in Figure 5.

### Table 3: Langford Fire: 90th Percentile by Month

<table>
<thead>
<tr>
<th>Month</th>
<th>90th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>May-09</td>
<td>00:01:41</td>
</tr>
<tr>
<td>Jun-09</td>
<td>00:01:59</td>
</tr>
<tr>
<td>Jul-09</td>
<td>00:02:27</td>
</tr>
<tr>
<td>Aug-09</td>
<td>00:02:06</td>
</tr>
<tr>
<td>Sep-09</td>
<td>00:01:46</td>
</tr>
<tr>
<td>Oct-09</td>
<td>00:02:01</td>
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<tr>
<td>Nov-09</td>
<td>00:01:48</td>
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<tr>
<td>Dec-09</td>
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<tr>
<td>Jan-10</td>
<td>00:01:28</td>
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<tr>
<td>Feb-10</td>
<td>00:01:44</td>
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<tr>
<td>Mar-10</td>
<td>00:01:39</td>
</tr>
<tr>
<td>Apr-10</td>
<td>00:01:44</td>
</tr>
<tr>
<td>May-10</td>
<td>00:01:20</td>
</tr>
<tr>
<td>Jun-10</td>
<td>00:01:27</td>
</tr>
<tr>
<td>Jul-10</td>
<td>00:01:34</td>
</tr>
<tr>
<td>Aug-10</td>
<td>00:01:21</td>
</tr>
</tbody>
</table>

### Figure 5: Langford 90th Percentile by Month

This graph shows that Langford has steadily improved its 90th percentile for fire dispatch from over 3 minutes April and May 2008 to 2 minutes or below. The trend lines show steady improvement to the present time. There may be a number of reasons for the longer times to dispatch in the second quarter of 2008 including the fact that a new CAD system had just been introduced. For the period measured (27 months) Langford has been at or lower than 2 minutes 60% of the time.

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6 The solid red line represents the linear trend; the dashed black line is a 6 month moving average.
3.2.6. Client Review

Langford’s dispatch clients were surveyed using the questionnaire shown in the appendix. A total of 8 fire departments responded out of 18 for a completion rate of 44%. Opinions regarding the service ranged, and in general the volunteer fire departments were very pleased with the level of dispatch provided, while career/composite departments were somewhat more critical of the call relay service as not meeting their needs.

In terms of potential improvements that could be made, the ability to fully link the dispatch information with the incident record for the department was noted as needing improvement. The update of department information into the dispatch CAD system on a more regular basis was identified; also the need to work to clarify response boundaries which are incorrect at times.

The capability of dispatch personnel was also reviewed and the larger departments in terms of call volume noted that it is sometimes inconsistent and during busy periods they do not get full radio support however this may not be covered by the contract with the CRD which specifies a call relay system and is an issue to be considered when the contract is renewed. The survey also confirmed that there has been a steady improvement over time.

A number of the fire chiefs also identified a need for a greater level of involvement with the 9-1-1 process in general. They identified concerns regarding 9-1-1 call management and triage which in their view should assign different call types and specifically Motor Vehicle Incidents to the fire department first. This issue could be addressed by having a fire service representative on the committee that deal with 9-1-1 issues. It should be noted that this need for further involvement in the 9-1-1 process was also enunciated by fire chiefs that are dispatched by Saanich.

There was also discussion regarding the dispute resolution model with Langford noting that it needs improvement. A number of the fire chiefs propose a more regular basis for meeting including a more immediate response to issues raised although once again it is noted this has been improving in the past year. At the present time the number of meetings scheduled meets the requirements of the contract. This may be made part of a longer-term business plan which was also proposed.

3.2.7. Summary

The Langford Fire Department provides dispatch service for itself and a number of other fire departments ranging from very small volunteer fire departments to urban departments. The dispatchers have considerable experience and are trained and managed to an existing system of policies.

The dispatch service provided by the Langford Fire Department is somewhat constrained by the language of the contract by the phrase ‘call relay’ which is not defined either in the contract, or in the NFPA standard. It appears this lack of clarity has contributed to some of the misunderstandings about the level of service expected and delivered.
Clarification of the level of service provided by any dispatch service should be clearly described and understood by the service provider and those receiving the service.

3.3. Saanich

3.3.1. Facility

The dispatch facility for the Saanich Fire Department is located on the north-east corner of Hall 1, which is at 760 Vernon. The fire dispatch as well as the police dispatch and the Saanich PSAP are located in a post-disaster extension to the fire hall.

This project was completed with the transition to the new facility in March 2008 and in terms of the NFPA 1221 requirements this would be the most secure facility of the three being reviewed. This will be discussed further but includes controlled access, redundant routing for telephone service and a full backup dispatch facility.

![Figure 6: Saanich Hall 1, Fire Dispatch Located to the Left of the Hose Tower](image)

3.3.2. Technology

The Saanich Fire Department dispatch technology is newest of the three centres in terms of its CAD system and the dispatch facility itself. Of the three centres it could be considered the most compliant in terms of the NFPA 1221 standard when all issues are considered. A much more detailed review of the technologies and the dispatch facility can be found in TM01B.

- CAD

The Saanich Fire Department (SFD) recently replaced its FDM CAD system with an Intergraph system. This CAD system went live in Q4 2009 and provides for an electronic interface with the BCAS for first responder calls as well as mobile workstations with GPS. The CAD is hosted in

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7 The Saanich PSAP and Police Dispatch also located in this facility on the floor above the Fire Dispatch

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Metro Vancouver and is connected by a primary and a secondary link. Saanich has also chosen to implement an additional level of redundancy with a mirrored server that can be utilized if either of the links to Vancouver is lost.

The CAD system used by Saanich and its dispatch clients has been developed and implemented with the assistance of E-Comm which hosts the primary and secondary servers. The system utilizes mapping similar to the Langford system.

- **Mobile Workstations**

Saanich has implemented mobile workstations for apparatus from its own department and others for which it provides service. The mobile workstations are Data911 units and connectivity with the CAD is maintained by using a commercial wireless carrier. The mobile workstation units have GPS and can be tracked.

- **Phones**

Saanich uses two phone systems, one for non-emergency and one for emergency calls. Both are Nortel units and they are described in greater detail in TM 01.

- **Radio**

Saanich like all other fire departments in the CRD utilizes the CREST radio system. Saanich has chosen to implement a Motorola Gold Elite console to manage radio channels in place of the Zetron system used formerly.

- **Voice Logging**

Voice logging equipment is contemporary and call check recorders are provided for the dispatchers.

- **Power**

Backup power is provided using a combination of diesel generator with a full UPS. This unit is located at the rear of the fire hall and is regularly tested.

- **Consoles**

The dispatch consoles are new and provide sit-to-stand capability to match the requirements of the dispatchers and to provide an appropriate ergonomic environment.

### 3.3.3. **Staff**

The SFD dispatch is staffed by two trained dispatchers per shift. The length of service varies from 1 month to 13 years. The dispatchers are dedicated to the dispatch facility with some relief being provided by trained fire fighters when available. Fire dispatchers have a specific training and mentoring program and the dispatch facility reports to an Assistant Chief whose time is 100% dedicated to dispatch. Dispatchers are paid at a rate of 90% of a first class fire fighter.
They work 42 hours per week averaged over 8 weeks with two 10 hour day shifts followed by two 14 hour nights shifts.

The dispatchers are covered by the collective agreement between Local 967 of the IAFF and the District of Saanich. The current collective agreement expired at the end of 2009 and labour relations are described as very good.

3.3.4. Business Continuity

SFD has a formal business continuity plan and for the purposes of dispatch this includes the ability to ‘fail over’ to E-Comm where dispatchers can take calls for Saanich and its dispatch clients and provide service by means of a connection to the CREST radio system. This capability is enhanced because Saanich and E-Comm (as well as Coquitlam) all use a standard implementation of the Intergraph CAD system.

3.3.5. Call Management

The analysis is based on 17,206 incidents between January 1, 2007 and November 19, 2009. All of the information is from the FDM RMS database. The data set provided, contained information for the following elements:

- Callers phone number and address;
- Time and date of the first call;
- The first unit dispatched; and
- Incident address, fire department responding, apparatus.

The call processing time mandated by the NFPA 1221 standard for fire dispatch is 60 seconds 90% of the time. The data set was reviewed and the dispatch interval was calculated as follows:

\[
\text{Dispatch Time} = \text{First Tone Time} - \text{Time of the First Call}.
\]

The data was also reviewed for call volume by day of the week and hour of the day.

Calls by day of the week

Analysis of the calls dispatched by day of the week displays a distribution that is typical of most fire services with a peak of calls at the end of the week. The data is shown in Table 4, with Friday being the busiest day of the week, approximately 8% busier than the slowest day which is Tuesday.
### Table 4: Saanich Fire, Calls by Day of the Week

<table>
<thead>
<tr>
<th>Day</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
<td>2,424</td>
</tr>
<tr>
<td>Monday</td>
<td>2,423</td>
</tr>
<tr>
<td>Tuesday</td>
<td>2,383</td>
</tr>
<tr>
<td>Wednesday</td>
<td>2,387</td>
</tr>
<tr>
<td>Thursday</td>
<td>2,423</td>
</tr>
<tr>
<td>Friday</td>
<td>2,563</td>
</tr>
<tr>
<td>Saturday</td>
<td>2,438</td>
</tr>
</tbody>
</table>

This information can be graphed as follows.

![Saanich Dispatch: Calls by DOW](image)

**Figure 7: Saanich Calls by Day of the Week**

**Calls by the hour of the day**

Calls dispatched by hour of the day are shown in Table 5 and once again this is fairly typical of a fire dispatch centre. The busiest hours are from 1000 to 1100 hours and from 1600 to 1700 hours; the slowest hour is from 0400 to 0500 hours. In this case the range of calls is much more dramatic with the increase being more than 300%.

<table>
<thead>
<tr>
<th>Hour</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000 hours</td>
<td>505</td>
</tr>
<tr>
<td>0100 hours</td>
<td>458</td>
</tr>
<tr>
<td>0200 hours</td>
<td>387</td>
</tr>
<tr>
<td>0300 hours</td>
<td>342</td>
</tr>
<tr>
<td>0400 hours</td>
<td>302</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hour</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0500 hours</td>
<td>323</td>
</tr>
<tr>
<td>0600 hours</td>
<td>392</td>
</tr>
<tr>
<td>0700 hours</td>
<td>612</td>
</tr>
<tr>
<td>0800 hours</td>
<td>797</td>
</tr>
<tr>
<td>0900 hours</td>
<td>921</td>
</tr>
</tbody>
</table>
Table 5: Saanich Fire Calls by Hour of the Day

<table>
<thead>
<tr>
<th>Hour</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 hours</td>
<td>974</td>
</tr>
<tr>
<td>1100 hours</td>
<td>958</td>
</tr>
<tr>
<td>1200 hours</td>
<td>955</td>
</tr>
<tr>
<td>1300 hours</td>
<td>922</td>
</tr>
<tr>
<td>1400 hours</td>
<td>915</td>
</tr>
<tr>
<td>1500 hours</td>
<td>963</td>
</tr>
<tr>
<td>1600 hours</td>
<td>973</td>
</tr>
<tr>
<td>1700 hours</td>
<td>969</td>
</tr>
<tr>
<td>1800 hours</td>
<td>856</td>
</tr>
<tr>
<td>1900 hours</td>
<td>840</td>
</tr>
<tr>
<td>2000 hours</td>
<td>766</td>
</tr>
<tr>
<td>2100 hours</td>
<td>731</td>
</tr>
<tr>
<td>2200 hours</td>
<td>615</td>
</tr>
<tr>
<td>2300 hours</td>
<td>565</td>
</tr>
</tbody>
</table>

Figure 8: Saanich Calls by Hour of the Day

90th Percentile

The ability to dispatch calls within 60 seconds 90% of the time is the standard outlined by the NFPA. The standard mandates that the 90th percentile and other statistics be calculated on a monthly basis; the 90th percentile is shown in the Table 6.

<table>
<thead>
<tr>
<th>Month</th>
<th>90th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-07</td>
<td>0:01:55</td>
</tr>
<tr>
<td>Feb-07</td>
<td>0:02:03</td>
</tr>
<tr>
<td>Mar-07</td>
<td>0:01:49</td>
</tr>
<tr>
<td>Apr-07</td>
<td>0:01:56</td>
</tr>
<tr>
<td>May-07</td>
<td>0:01:56</td>
</tr>
<tr>
<td>Jun-07</td>
<td>0:01:52</td>
</tr>
<tr>
<td>Jul-07</td>
<td>0:01:57</td>
</tr>
<tr>
<td>Aug-07</td>
<td>0:01:55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Month</th>
<th>90th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep-07</td>
<td>0:02:02</td>
</tr>
<tr>
<td>Oct-07</td>
<td>0:01:46</td>
</tr>
<tr>
<td>Nov-07</td>
<td>0:02:04</td>
</tr>
<tr>
<td>Dec-07</td>
<td>0:01:40</td>
</tr>
<tr>
<td>Jan-08</td>
<td>0:00:57</td>
</tr>
<tr>
<td>Feb-08</td>
<td>0:01:39</td>
</tr>
<tr>
<td>Mar-08</td>
<td>0:01:47</td>
</tr>
<tr>
<td>Apr-08</td>
<td>0:01:55</td>
</tr>
</tbody>
</table>
Table 6: Saanich Fire, 90th Percentile by Month

What is apparent from this table is that Saanich has been very consistent in terms of their performance. This is illustrated in Figure 9.

<table>
<thead>
<tr>
<th>Month</th>
<th>90th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>May-08</td>
<td>0:01:56</td>
</tr>
<tr>
<td>Jun-08</td>
<td>0:02:08</td>
</tr>
<tr>
<td>Jul-08</td>
<td>0:02:03</td>
</tr>
<tr>
<td>Aug-08</td>
<td>0:02:14</td>
</tr>
<tr>
<td>Sep-08</td>
<td>0:02:03</td>
</tr>
<tr>
<td>Oct-08</td>
<td>0:02:03</td>
</tr>
<tr>
<td>Nov-08</td>
<td>0:01:56</td>
</tr>
<tr>
<td>Dec-08</td>
<td>0:01:53</td>
</tr>
<tr>
<td>Jan-09</td>
<td>0:01:47</td>
</tr>
<tr>
<td>Feb-09</td>
<td>0:01:47</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Month</th>
<th>90th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar-09</td>
<td>0:01:40</td>
</tr>
<tr>
<td>Apr-09</td>
<td>0:01:52</td>
</tr>
<tr>
<td>May-09</td>
<td>0:01:51</td>
</tr>
<tr>
<td>Jun-09</td>
<td>0:02:17</td>
</tr>
<tr>
<td>Jul-09</td>
<td>0:01:58</td>
</tr>
<tr>
<td>Aug-09</td>
<td>0:01:58</td>
</tr>
<tr>
<td>Sep-09</td>
<td>0:01:54</td>
</tr>
<tr>
<td>Oct-09</td>
<td>0:01:52</td>
</tr>
<tr>
<td>Nov-09</td>
<td>0:01:43</td>
</tr>
</tbody>
</table>

Figure 9: Saanich 90th Percentile by Month
This graph shows that Saanich’s 90th percentile has been at or below 2 minutes 26 out of 35 months, or 74% of the time. The trend lines\textsuperscript{8} show consistent performance throughout the nearly 3 years of data.

3.3.6. Client Review

The dispatch clients for the SFD were surveyed to gather feedback on the level of service provided. The survey covered a number of issues including what worked well, and what didn’t. The survey also inquired about service specifically related to the information provided as part of the initial dispatch, further updates and support while on route to calls and at emergency scenes, post incident details regarding the completion of the incident, and the vendor’s ability to provide information regarding system changes.

In Saanich’s case, 100% of their dispatch clients completed the survey, and the feedback was very positive. The staff and technology were very highly rated overall.

In terms of potential improvements that could be made, the assignment of a number of talk groups when responding to mutual aid incidents was mentioned as potentially confusing also one career fire department noted that the rip and run printer was slow while the volunteer departments found it to be quite helpful with one chief recommending that a map be added to it if possible. One dispatch client noted his concern that he disagreed with 9-1-1 ‘triage’ that has motor vehicle incidents being transferred first to BCAS and felt that a greater level of participation by the fire services with the 9-1-1 users’ group would be helpful.

There were no negative comments or areas for improvement identified regarding the staff.

3.3.7. Summary

The Saanich Fire Department dispatch service has made major changes in recent years to address levels of service, staffing, technology, business continuity and security. Their CAD system supports mobile workstations and has recently implemented the interface with BCAS to manage first medical responder calls.

The dispatchers have a defined training program and are directly supervised by an Assistant Chief. They are career personnel, dedicated to dispatch.

\textsuperscript{8} The solid red line represents the linear trend, the dashed black line is a 6 month moving average.
3.4. Victoria

3.4.1. Facility

The dispatch facility at the Victoria Fire Department (VFD) is located in the centre bay of Hall 1 on Yates Street and is the least compliant with the 1221 standard when all issues discussed in the standard are considered. The concerns include the relative vulnerability, the cramped conditions, the single working position and the lack of many technical features. Figure 10 shows the front of Hall 1; the fourth bay from the right was converted to a dispatch position some years ago.

![Figure 10: Victoria Fire Department Hall 1](image)

The VFD dispatch facility is dated and consideration should be given to replacing it. The present space available does not provide sufficient room for a second workstation to assist with managing additional call loads or for proper training. The consoles are also ‘fixed in place’ and most contemporary dispatch facilities have sit-to-stand workstations to provide ergonomic comfort for dispatchers.

3.4.2. Technology

The technology in the VFD dispatch office as noted requires considerable upgrading to make it compliant with current standards. A number of items will be discussed below and these include the equipment within the centre, and the dispatch facility itself. A much more detailed review of the technologies and the dispatch facility can be found in TM01B.

- CAD

The CAD system is provided by FDM Software of North Vancouver. The CAD is at or near the current version and has an associated Record Management System (RMS) from the same vendor. Victoria Fire has been a long-time user of CAD but has not to this point chosen to implement the mapping module. CAD mapping provides for a great deal of precision when
locating incidents, the calling party’s location and the various incidents that are in progress and it is recommended that VFD implement the map module.

The CAD system tracks each incident the department responds to including the date and time for all related transactions as well as the caller’s name and number where it is available, the number of units that responded and comments entered based on situational updates from the scene, additional information provided by the public, etc.

- **Mobile Workstations**

At the present time the VFD has not implemented mobile workstations in the apparatus though there is planning for this. This is recommended for a number of reasons including the ability of the dispatchers to track units that are out of the fire hall given that the mobile workstations units are equipped with GPS and to provide a map with routing information for fire crews.

- **Phones**

The VFD uses three separate phone systems as noted and some consideration should be given to changing the configuration of the phone system with a view to reducing the number of phone units if possible. The phone and radio system should be able to be managed with a common headset that has proper load balancing and the use of headsets should be mandatory.

- **Radio**

The radio used by the VFD is the CREST system, similar to the other fire departments in the CRD. A full review of the radio system is not within the scope of this study. As noted above, the use of headsets for the radio and telephone system should be a requirement to help to manage background noise as well as to allow dispatchers to operate the consoles and the keyboards related to various technologies, with both hands.

- **Voice Logging**

The voice logging system utilizes call check recorders at the dispatch position as well as a master voice logging system.

- **Power**

The VFD dispatch office is provided with uninterruptable power from various battery UPS units; the fire hall is also protected by an Onan generator at Hall 1. In general it appears that the power management system is well designed and regularly tested.

- **Consoles**

The consoles employed by the VFD are very dated and should be replaced to better position each of the various components for best access by the dispatchers. Consoles today should be designed to meet ergonomic standards and it is recommended that they be sit-to-stand which
affords the greatest degree of flexibility for dispatchers during a long duty cycle, and for people of different heights.

3.4.3. Staff

The VFD dispatch is staffed with one trained dispatcher per shift. The dispatchers are dedicated to the dispatch facility with some relief being provided by fire fighters when available. Fire dispatchers have a specific training and mentoring program and the dispatch facility reports to the on-duty Battalion Chief. The length of service varies from 11 months to 47 months.

The dispatchers are paid at a rate of 90% of a first class fire fighter. They work 42 hours per week averaged over 8 weeks. They are covered by the collective agreement between Local 730 of the IAFF and the City of Victoria. The current collective agreement expired at the end of 2009 and labour relations are described as good.

3.4.4. Business Continuity

The VFD does not have a dedicated secondary dispatch facility. If the dispatch facility at Hall 1 needed to be vacated, dispatch would be managed by pen and paper from another location such as the other two fire halls, but more likely from the Victoria Police Department. The latter would allow for emergency calls to be received as well as use of the radio system.

3.4.5. Call Management

The analysis is based on 13,041 incidents between January 1, 2007 and December 31, 2009. All of the information is from the FDM RMS database. The data set provided, contained information for the following elements:

- Caller’s number and address;
- Time and date of the first call;
- The first unit dispatched; and
- Incident address, fire department responding, apparatus.

The call processing time mandated by the NFPA 1221 standard for fire dispatch is 60 seconds 90% of the time. The data set was reviewed and the dispatch interval was calculated as follows:

\[
\text{Dispatch Time} = \text{Dispatch} - \text{Incident Begin Time}.
\]

The data was also reviewed for call volume by day of the week and hour of the day.

Calls by day of the week

Analysis of the calls dispatched by day of the week display a distribution that is typical of most fire services with a peak of calls at the end of the week. The data is shown in Table 7, with Friday being the busiest day of the week, approximately 11% busier than the slowest day which is Sunday.
<table>
<thead>
<tr>
<th>Day</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
<td>1,831</td>
</tr>
<tr>
<td>Monday</td>
<td>1,873</td>
</tr>
<tr>
<td>Tuesday</td>
<td>1,891</td>
</tr>
<tr>
<td>Wednesday</td>
<td>1,920</td>
</tr>
<tr>
<td>Thursday</td>
<td>1,915</td>
</tr>
<tr>
<td>Friday</td>
<td>2,025</td>
</tr>
<tr>
<td>Saturday</td>
<td>1,946</td>
</tr>
</tbody>
</table>

**Table 7: Victoria Fire Calls by Day of the Week**

This information can be graphed as follows.

![Victoria Fire: Calls by Day of the Week](image)

**Figure 11: Victoria Calls by Day of the Week**

**Calls by the hour of the day**

Calls dispatched by hour of the day are shown in Table 8 and once again this is fairly typical of a fire dispatch centre. The busiest hour is from 1100 to 1200 hours; the slowest hour is from 0400 to 0500 hrs. In this case the range of calls is much more dramatic with the increase being more than 350%.

<table>
<thead>
<tr>
<th>Hour</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000 hours</td>
<td>427</td>
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<tr>
<td>0100 hours</td>
<td>355</td>
</tr>
<tr>
<td>0200 hours</td>
<td>384</td>
</tr>
<tr>
<td>0300 hours</td>
<td>295</td>
</tr>
<tr>
<td>0400 hours</td>
<td>248</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hour</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0500 hours</td>
<td>240</td>
</tr>
<tr>
<td>0600 hours</td>
<td>295</td>
</tr>
<tr>
<td>0700 hours</td>
<td>454</td>
</tr>
<tr>
<td>0800 hours</td>
<td>605</td>
</tr>
<tr>
<td>0900 hours</td>
<td>701</td>
</tr>
</tbody>
</table>
Table 8: Victoria Calls by Hour of the Day

<table>
<thead>
<tr>
<th>Hour</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 hours</td>
<td>656</td>
</tr>
<tr>
<td>1100 hours</td>
<td>709</td>
</tr>
<tr>
<td>1200 hours</td>
<td>795</td>
</tr>
<tr>
<td>1300 hours</td>
<td>763</td>
</tr>
<tr>
<td>1400 hours</td>
<td>724</td>
</tr>
<tr>
<td>1500 hours</td>
<td>731</td>
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<tr>
<td>1600 hours</td>
<td>790</td>
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<td>1700 hours</td>
<td>741</td>
</tr>
<tr>
<td>1800 hours</td>
<td>737</td>
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<tr>
<td>1900 hours</td>
<td>624</td>
</tr>
<tr>
<td>2000 hours</td>
<td>610</td>
</tr>
<tr>
<td>2100 hours</td>
<td>542</td>
</tr>
<tr>
<td>2200 hours</td>
<td>507</td>
</tr>
<tr>
<td>2300 hours</td>
<td>468</td>
</tr>
</tbody>
</table>

Figure 12: Victoria Calls by Hour of the Day

90th Percentile

The ability to dispatch calls within 60 seconds 90% of the time is the standard outlined by the NFPA. The standard mandates that the 90th percentile and other statistics be calculated on a monthly basis; the 90th percentile is shown in Table 9.

<table>
<thead>
<tr>
<th>Month</th>
<th>90th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-07</td>
<td>0:01:10</td>
</tr>
<tr>
<td>Feb-07</td>
<td>0:01:17</td>
</tr>
<tr>
<td>Mar-07</td>
<td>0:01:23</td>
</tr>
<tr>
<td>Apr-07</td>
<td>0:01:18</td>
</tr>
<tr>
<td>May-07</td>
<td>0:01:24</td>
</tr>
<tr>
<td>Jun-07</td>
<td>0:01:19</td>
</tr>
<tr>
<td>Jul-07</td>
<td>0:01:20</td>
</tr>
<tr>
<td>Aug-07</td>
<td>0:01:04</td>
</tr>
<tr>
<td>Sep-07</td>
<td>0:01:09</td>
</tr>
<tr>
<td>Oct-07</td>
<td>0:01:25</td>
</tr>
<tr>
<td>Nov-07</td>
<td>0:01:12</td>
</tr>
<tr>
<td>Dec-07</td>
<td>0:01:21</td>
</tr>
<tr>
<td>Jan-08</td>
<td>0:01:29</td>
</tr>
<tr>
<td>Feb-08</td>
<td>0:01:25</td>
</tr>
</tbody>
</table>
Month | 90th Percentile
---|---
Mar-08 | 0:01:22
Apr-08 | 0:01:05
May-08 | 0:01:13
Jun-08 | 0:01:06
Jul-08 | 0:01:10
Aug-08 | 0:01:00
Sep-08 | 0:01:24
Oct-08 | 0:01:43
Nov-08 | 0:01:25
Dec-08 | 0:01:30
Jan-09 | 0:01:21

Month | 90th Percentile
---|---
Feb-09 | 0:01:40
Mar-09 | 0:01:47
Apr-09 | 0:01:24
May-09 | 0:01:46
Jun-09 | 0:01:53
Jul-09 | 0:01:54
Aug-09 | 0:01:39
Sep-09 | 0:01:43
Oct-09 | 0:01:29
Nov-09 | 0:01:17
Dec-09 | 0:01:23

Table 9: Victoria Fire 90th Percentile by Month
What is apparent from this table is that Victoria has been reasonably consistent in terms of their performance however call processing times are increasing. This is illustrated in Figure 13.

![Victoria Fire: 90th Percentile](image)

Figure 13: Victoria 90th Percentile by Month
This graph shows that Victoria’s 90th percentile has been at or below 2 minutes 100% of the time. The trend lines\(^9\) show that overall, performance is declining throughout the 3 years of data, that is the times to complete the dispatch are increasing by in the range of 30 seconds over the period surveyed.

\(^9\) The solid red line represents the linear trend; the dashed black line is a 6 month moving average.
3.4.6. Summary

The fire dispatch facility at Victoria Fire requires the greatest amount of work and if the function is to be retained by the department then a major upgrade to the facility must be considered. For security reasons it should be relocated to a less visible and less vulnerable part of the fire hall, with expanded facilities that would include a minimum of two full working positions with CAD, radio, paging, telephone and voice logging equipment that would comply with NFPA 1221.

The dispatch facility should also be reviewed for performance to ensure that the dispatch of VFD units is completed more quickly and with greater consistency than is presently the case.

3.5. Comparison of CRD Fire Dispatch Providers

90th Percentile

There are a number of ways to examine the dispatch data from Langford, Saanich and Victoria. The most important accepted measure is the call turnover time or dispatch time. The NFPA standard proposes that calls be dispatched within 60 seconds, 90% of the time measured on a monthly basis.

The graph in Figure 14 illustrates the comparative success of the three dispatch centres in meeting this test, from January 2007 forward. The previous sections have reviewed the dispatch performance of each dispatch centre separately. The graph portrays the data for each department allowing a comparison between them. The goal of 1 minute identified in the NFPA standard is shown in the solid red line for comparison.
Figure 14: Comparison of 90th Percentile, Langford, Saanich, Victoria

The data set is not complete for all three departments for the complete range of time as noted previously. There is however enough data to illustrate the differences between the three centres. Specifically it appears that Langford initially had times that were well outside of the performance requirements but that their performance has been improving and for the final months of the data set their compliance is the second best of the three.

Saanich Fire has the most consistent performance when measured against the standard, though it is still outside of the NFPA goal for all months with the exception of one. Victoria Fire appears to have been reasonably consistent with a slightly wider range than Saanich and is trending slightly upward over the period of time surveyed. One caveat for this comparison is that the procedures for call taking and dispatch and the recording of the metrics for these are not identical. In addition each employs different technologies and this may also account for some of the difference between their performance times.

Monthly Call Volume

The monthly call volume between January 2007 and May 2010 is illustrated in Figure 15. This graph is helpful in understanding some of the reasons for the variance in the 90th percentile especially when compared to the level of staffing. This graph shows that Victoria’s call volume is approximately 30% higher than that of Langford when calculated on a monthly basis; at the same time, their staffing is the same, with one dispatcher per shift on a regular basis.

Saanich has a call volume that is larger than Langford or Victoria and is nearly half of the call volume in the CRD. Saanich has recently adopted a model with two dispatchers on duty on a regular basis.
Figure 15: Monthly Call Volume Langford, Saanich, Victoria

The relative share of call volume for the period of comparable data is shown in Table 10.

<table>
<thead>
<tr>
<th>Year/Month</th>
<th>Saanich</th>
<th>Victoria</th>
<th>Langford</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2008</td>
<td>45%</td>
<td>32%</td>
<td>23%</td>
</tr>
<tr>
<td>April 2008</td>
<td>41%</td>
<td>35%</td>
<td>24%</td>
</tr>
<tr>
<td>May 2008</td>
<td>41%</td>
<td>35%</td>
<td>24%</td>
</tr>
<tr>
<td>June 2008</td>
<td>40%</td>
<td>34%</td>
<td>26%</td>
</tr>
<tr>
<td>July 2008</td>
<td>41%</td>
<td>32%</td>
<td>28%</td>
</tr>
<tr>
<td>August 2008</td>
<td>39%</td>
<td>33%</td>
<td>28%</td>
</tr>
<tr>
<td>September 2008</td>
<td>47%</td>
<td>31%</td>
<td>22%</td>
</tr>
<tr>
<td>October 2008</td>
<td>45%</td>
<td>30%</td>
<td>25%</td>
</tr>
<tr>
<td>November 2008</td>
<td>48%</td>
<td>30%</td>
<td>22%</td>
</tr>
<tr>
<td>December 2008</td>
<td>47%</td>
<td>29%</td>
<td>24%</td>
</tr>
<tr>
<td>January 2009</td>
<td>45%</td>
<td>33%</td>
<td>21%</td>
</tr>
<tr>
<td>February 2009</td>
<td>45%</td>
<td>31%</td>
<td>24%</td>
</tr>
<tr>
<td>March 2009</td>
<td>47%</td>
<td>29%</td>
<td>24%</td>
</tr>
<tr>
<td>April 2009</td>
<td>45%</td>
<td>33%</td>
<td>22%</td>
</tr>
<tr>
<td>Year/Month</td>
<td>Saanich</td>
<td>Victoria</td>
<td>Langford</td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>May 2009</td>
<td>45%</td>
<td>29%</td>
<td>26%</td>
</tr>
<tr>
<td>June 2009</td>
<td>44%</td>
<td>31%</td>
<td>25%</td>
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<tr>
<td>July 2009</td>
<td>43%</td>
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<td>28%</td>
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<tr>
<td>August 2009</td>
<td>42%</td>
<td>30%</td>
<td>28%</td>
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<tr>
<td>September 2009</td>
<td>46%</td>
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<td>25%</td>
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<tr>
<td>October 2009</td>
<td>46%</td>
<td>28%</td>
<td>26%</td>
</tr>
<tr>
<td>November 2009</td>
<td>44%</td>
<td>31%</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>44%</td>
<td>31%</td>
<td>25%</td>
</tr>
</tbody>
</table>

**Table 10: Percentage of Call Volume by Centre**

The pie chart in Figure 16 illustrates the balance of calls dispatched between the three centres, and as noted previously call volume managed by Saanich is increasing, for Langford it is steady and for Victoria is showing a slight decrease.

![3 Centres: % of Calls Dispatched](image)

**Figure 16: 3 Centres: Percentage of Calls Dispatched**

### 3.6. Benchmark Fire Dispatch Providers

The primary comparison for dispatch purposes is the NFPA 1221 Standard. This is contained in the many contracts in BC. The 1221 benchmark is developed and owned by the fire service in North America through its participation with the NFPA.

It has been discussed elsewhere that the standard has been in existence since the late 1890’s, but the matter of performance standards is quite new. The requirement to complete the task of dispatching within a certain timeframe was not codified until 1994. Prior to this time performance was not discussed.
Since 1994 the time to dispatch fire apparatus has been agreed as being 60 seconds, but it wasn’t until 2002 that a performance completion criterion was established as being 95% of all calls within that timeframe. The 95% time for completion of the dispatch process proved to be challenging and so in the 2010 edition of the standard this has been relaxed to 90% of the time. This change over time is shown in Figure 17.

Figure 17: NFPA 1221 Changes over Time

Because performance standards for fire dispatching are relatively new their implementation by service providers has lagged the adoption of the standard itself. Most if not all fire dispatch providers have only recently begun to measure their performance and not unlike the situation in the CRD have found that when they measured it, that they did not comply.

The authors of this study have worked with a great many fire dispatch providers in Ontario, Alberta and British Columbia and in general terms, the first time dispatch performance is measured it is found to be at or near the level of service found in the CRD. Once the initial dispatch performance measurement has been completed however, most agencies have begun quite vigorously to formally adopt the new standard and then to implement Quality Assurance (QA) programs to address any shortcomings.

For the reason that their current performance does not meet the standard and considering that one or more of them have stated in their contracts that they will meet the NFPA standard, other fire dispatch providers are reluctant to provide this dispatch data where it will be identified in a study.
3.7. Emerging Technologies

3.7.1. Challenges

There is not a long list of challenges in terms of emergency technologies that face the fire service in terms of dispatch in the CRD. Many of these have been addressed with the recent implementation of phase 2 wireless for which both Intergraph and FDM are compliant as well as the interface between BCAS and the fire service and mobile workstations.

If there are challenges they may relate to changes that are reasonably imminent with regard to the next generation 9-1-1 systems, and the ways in which additional layers of data are down-streamed from a PSAP as part of the call management process. Clearly a great deal of this information may provide a value add to the fire dispatch process but the existing CAD and telephony systems will need to be modified to manage and receive these in a manner that is useful to the fire service. That said, the next generation 9-1-1 systems are still in development and while they may in the future provide significant opportunities, there is not a full consensus on how they will technically operate, nor when they will be available.

An additional challenge in the short term is the implementation of a standard fire RMS system. At present in the CRD there a number of different RMS systems that have not been implemented in the same way with the result that service benchmarks are dissimilar. An additional challenge is the lack in all cases of an interface from the dispatch CAD to the RMS to provide the core data required for the incident report and ultimately the transfer of information to the Office of the Fire Commissioner.

3.7.2. Opportunities

The issue of non-linked record systems has been addressed in other jurisdictions which have implemented a standard Fire RMS with a full linkage from and to the CAD system. An example of this is Project FIRES which went live in 2005 in Vancouver and Richmond, and now has added New Westminster, Port Moody, Delta, Saanich, Oak Bay, Esquimalt, Central Saanich with Coquitlam and the Sunshine Coast fire departments in the process of joining. This is a hosted, shared system that is owned by the participating fire departments[10]. A number of dispatch providers in BC are members of this service and one or more interior BC dispatch providers is considering joining.

This is a model that the CRD should consider as it ensures a standard approach with identical benchmarks and with all necessary interfaces. In any solution, the objective should be to establish standard performance metrics that would support intra-regional benchmarking at a minimum.

A second opportunity will be the full implementation of the interface from BCAS to the fire departments to increase the accuracy and to shorten the time taken to provide dispatch information for medical first responder calls. These interfaces are operational with both Langford

[10] Project FIRES uses a standard configuration of FDM RMS for all users; the costing for the Project FIRES model also contemplates that users can utilize all of the RMS modules at their option.

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and Saanich dispatch CAD systems and should be implemented for all fire departments in the CRD.

3.8. Dispatch Options

There are a number of options for the provision of fire dispatch in the CRD and they range from the status quo to some degree of consolidation or possibly to outsourcing.

The status quo would not be recommended for a number of reasons including the need to modernize the dispatch facility for Victoria Fire. This was discussed in a previous section and would involve a re-build of their dispatch facility to include a second working position an increase in security, and additions to CAD to include mapping, mobile workstations with GPS and an interface from BCAS.

That said, there is nothing inherently wrong with continuing with three dispatch providers. The primary focus should always be on ensuring that the work itself is completed within the timeframe provided by the NFPA 1221 standard, with the highest degree of accuracy. The provision of fire dispatch should also be provided from a safe and secure environment with an operating business continuity strategy and with all appropriate technologies for emergency responders. That said, it may be that there are cost benefits to consolidation of fire dispatch in terms of the required support for technologies as well as staffing and management.

One option could see the consolidation from three, to two centres with the most obvious ‘pairing’ being Langford and Victoria as they currently have the same CAD vendor and in theory would have less changes to manage. This pairing would also be an option to more closely balance the existing call volume. If this consolidation were to occur it would require a minimum of two personnel at each of the remaining two centres and there would not likely be a reduction in staffing costs within the region. At the present time Victoria and Saanich dispatchers are paid at 90% of the first class fire fighter rate while Langford is paid at a lesser rate. However within two years each of the centres will pay their dispatchers at the same 90% rate and there is likely to be little or no cost savings, however the operational efficiency will likely increase.

With two dispatch centres there may be more of an opportunity to provide backup within the CRD, however this would not be a completely integrated business continuity model as the present time Saanich and Langford/Victoria are on different CAD systems and the transition to a single CAD would be complex and require a significant capital cost. Regardless, if the resulting configuration is two fire dispatch centres, a longer term goal would be to implement a single technology platform to reduce costs, standardize training and to provide a higher level of business continuity.

Another option would be to consider a single dispatch provider and based on the current call volume for all fire departments in the CRD, might allow for a reduction in staff to a total three as a minimum, but this would require further consideration of the dispatch model to be employed as well all the transition to a single CAD system.
The final option would involve the out-sourcing of dispatch to another service provider that had the capacity for the CRD call volume. At the present time the City of Surrey is proposing a much larger, consolidated fire dispatch centre; as well there are other fire dispatch providers such as E-Comm, Nanaimo and others that have the capacity to address this issue.

Dispatch consolidations are complex and regardless of which further option is chosen some consideration of the multiple elements should be carefully reviewed. The following diagram in Figure 18 is a flow chart of the high-level steps required for any dispatch transition and is based on experience with many similar transitions in BC in the past 15 years.

**Figure 18: Dispatch Transition Model**

Based on this model, it is possible to enable a dispatch transition within a 6-8 month period given that it is fully resourced and supported. Any decision to authorize such a transition would require a complete detailed design and cost review.
4. Summary

4.1. Operations

9-1-1 call answer, police dispatch and fire dispatch functions within the CRD are handled by seven separate communications centres. In theory, one communications centre with appropriate back-up and staffing could easily provide these services for the CRD population. There are however very few such fully integrated models. In Canada, Lethbridge and Calgary may be the closest examples of a unified 9-1-1 Call Answer plus Police, Fire and EMS dispatch operation. More often 9-1-1 facilities are increasingly consolidated amongst PSAPs; in a similar way Police, Fire and EMS dispatchers consolidate, most often within that class of service.

4.2. Standards of Service

All three primary PSAPs provide 9-1-1 service that generally meets or exceeds current industry standards. Fire dispatch services in the CRD for the most part are improving, but do not yet appear to meet external reference standards.

4.3. Risks

Adequate back-up facilities, procedures and network redundancy are in place to ensure business continuity. The lack of formal agreements between CRD and the various service providers is a risk factor over the long term. In terms of fire dispatching, the facility at VFD Hall 1 is the least compliant when considered in terms of the relevant standard; conversely the dispatch facility used by Saanich would be the most compliant of the three when considering all of the elements of NFPA 1221.

4.4. Governance

Overall governance of 9-1-1 and fire dispatch services in the CRD is informal and somewhat fragmented. There is a lack of formal agreements between the parties and no established mechanism to review performance reports and take appropriate action.

4.5. Emergency Technologies

All three primary PSAPs are equipped with telecommunications and CAD technology that is commonly used in the industry including display of Wireless Phase 2 location information. There are currently no set plans to introduce Next Generation 9-1-1 technology.

The fire service technologies are all currently capable of coping with existing issues include Wireless Phase 2 and an interface with BCAS for first responder call information. Not all fire departments however have the benefit of an integrated fire record management system and this poses challenges on a number of levels.
5. Recommendations

5.1. Fire Dispatch Operations

Fire dispatch operations in each of the three centres does not fully meet the requirements of NFPA 1221—2010. In terms of compliance with the NFPA standard it appears that Saanich is the most compliant when all elements of the standard are considered followed by Langford and Victoria in that order. Regardless, the dispatchers in each case were observed as they operated the respective dispatch systems and there is no obvious concern regarding their understanding of the work they are performing. Rather the variance in the dispatch management may be attributable at least in part to a lack of common benchmarks, a lack of a standard workflow and in the case of Victoria a lack of sufficient technologies to achieve the expected standards.

Recommendation: The CRD consider the implementation of standard benchmarks for dispatch performance based on the NFPA 1221 Standard to allow for an accurate comparison and to ensure that fire dispatching is completed in the most timely and effective manner. It is also recommended that relevant sections of the NFPA 1061 and 1561 Standards be included as they relate to technical competence and the operation of fire dispatch to support emergency scene operations.

The two fire dispatch centres with dispatch clients were surveyed and based on the results there appear to be more technical issues with Langford given multiple databases for the record management systems. In terms of dispatch operations the departments surveyed also identified some performance concerns with Langford but noted these are being addressed and that the situation is improving.

The issue of performance standards and reporting milestones are identified as issues to be considered when setting a dispatch contract. There are several reasons for this including the improved clarity regarding these issues.

Recommendation: That all future dispatch contracts contain performance standards and provide for effective user groups to regularly review all aspects of the dispatch service including technology and call management.

5.2. Fire Dispatch Technologies

The CAD systems used by the three dispatch providers in the CRD are provided by FDM and Intergraph and both are technically compliant in terms of call handling, mapping (where this has been implemented), the ability to support mobile workstations, utilize GPS for vehicle tracking and recommendations, support an electronic interface from BCAS for first responder calls, etc. As discussed above however, their workflow is not identical and so true benchmarks cannot be developed.

The use of mapping, mobile workstations, GPS and an interface with BCAS should be considered as minimum requirements for all fire departments in the CRD. To the degree
possible these should be standardized to the highest degree possible to support common benchmarks and safe and efficient interoperability.

**Recommendation:** That minimum standards be adopted for fire dispatch equipment would include CAD with mapping, capability for GPS and mobile workstations for first-line units and an interface from BCAS for the timely management of first responder calls.

Fire departments require an RMS that is fully integrated with their dispatch CAD system to ensure the accurate record of all responses. In addition the RMS should provide the various modules required to correctly manage staff training, equipment and properties including pre-plan information and that this information should be capable of being uploaded to the dispatch CAD and to the mobile workstations where they are deployed. The RMS should also be developed with a standard workflow and metrics to ensure that comparable benchmarks can be established within the CRD.

**Recommendation:** That all fire departments have the option to participate with an RMS integrated with the dispatch CAD system to provide all required information as part of the dispatch process, and to manage all required matters related to personnel, equipment and properties.

**Recommendation:** That the CRD consider using a standardized, hosted RMS to reduce costs and to support the development of common benchmarks.

The technologies for fire dispatch are critical systems and each should have full redundancy which is not the case with all systems at the present time. The ability to ensure a fully redundant backup strategy that is regularly tested should be a minimum requirement; one that is nearly fully implemented in at least one case.

**Recommendation:** That all fire dispatch providers in the CRD have a fully tested disaster recovery model that allows for the dispatch of units from other than their regular centre and that this capability should be regularly tested.

### 5.3. Fire Dispatch Service Delivery Options

The fire dispatch service options going forward may include some degree of consolidation, which is discussed in Section 3. If this were to occur it may result in two fire dispatch centres in the CRD and some reallocation of dispatch clients within this area, and by mutual agreement could provide for a balancing of call volume between them.

As part of the service delivery consideration it should be noted that there is a great deal of consolidation of dispatch centres for fire, police and ambulance in Canada, particularly in Alberta and BC. At the present time BCAS provides dispatch for the province from three centres in Metro Vancouver, in the CRD and in Kamloops. In Alberta, the ministry with responsibility for ambulance service has begun consolidation of more than 20 dispatch centres to a maximum of three.
Fire dispatch is also being consolidated in many areas with dispatch providers such as E-Comm, Fraser Valley Regional District, Kelowna, Prince George and the RDFFG, Saanich, Surrey, Trail and others each adding dispatch clients in the past several years. This provides an opportunity for the CRD to consider establishing as part of its renewed contract for service, the option to market its service on Vancouver Island or elsewhere. The reasons for this would include achieving a higher call volume that supports the degree of specialization and performance required, as well as providing potential offsets for some costs for an improvement in service and technologies.
6. References

[1] TM-01B - CRD Fire Dispatch - **Situation Analysis** - Client Draft, Planetworks Consulting Corp, October 2010

[2] TM-02B - CRD Fire Dispatch - **Standards and Developments**, Planetworks Consulting Corp, October 2010

7. Appendix 1: Terms and Definitions

ALI  Automatic Location Identification
ANI  Automatic Number Identification
ASP  Access Service Provider
CAD  Computer Aided Dispatch
E9-1-1 Enhanced 9-1-1
EMD  Emergency Medical Dispatch
EMS  Emergency Medical Service
ESZ  Emergency Response Zone
GIS  Geographic Information System
GPS  Global Positioning System
LFD  Langford Fire Department
MSAG Master Street Address Guide
NFPA National Fire Protection Association
NG9-1-1 Next Generation 9-1-1
PBX  Private Branch Exchange
PSAP Public Safety Answering Point
PSN/PSTN Public Switched Network/Public Switched Telephone Network
SFD  Saanich Fire Department
SSAP Secondary Safety Answering Point
SOP  Standard Operating Procedure (or Policy)
UPS  Uninterruptable Power Supply
VFD  Victoria Fire Department
VoIP  Voice over Internet Protocol
WL2 Wireless Phase 2
WSP  Wireless Service Provider
8. Appendix 2: Fire Dispatch Survey

CRD 911 and Fire Dispatch Review
Fire Dispatch Questionnaire

The following questionnaire is designed to provide an opportunity for you, on behalf of your fire department to comment on the dispatch service you receive. Please provide as much information as you feel appropriate including what works well, and what you feel might be improved.

1. Please forward the completed questionnaire, either by email to dwmitchell@telus.net; or by fax to 1-604-552-8951
2. If you wish to discuss any of these issues further, please either
   a. Phone at 1-604-812-8951, or
   b. Email your additional comments to dwmitchell@telus.net

Questionnaire

1. Survey completed by:
   a. Name:____________________
   b. Fire Department_____________________
   c. Do you wish the undersigned to contact you to discuss any aspect of dispatch:______

2. Please provide your comments regarding your overall impression of your fire dispatch service
   a. What works well in your opinion?
   b. What requires improvement?

3. Dispatch Information
   a. When you are dispatched to an incident either by page, radio, tone-out or phone call:
      i. Is the information provided by the dispatch service complete? If not, can you provide an example?
ii. If not, what is generally missing, and why is this important to you?

iii. Is the dispatch information you receive correct; if not can you provide an example?

iv. If you could change just one thing to improve the dispatch process, what would it be?

v. Please provide any further comment regarding the dispatch process.

b. When you are responding to an incident or operating at the scene:
   i. Are you satisfied with your ability to contact a dispatcher to receive additional information, to request additional support, etc? Can you give a representative example?

   ii. Is there a service or support that you would like to receive while on route or at the scene that you do not currently receive? If so, please provide details.

   iii. When you attempt to contact your dispatch, is their response timely? Can you provide a representative example?

c. Post Incident:
   i. Do you receive sufficient incident details to complete your reporting or journal entries? If not, what additional data should be provided?

d. Service overall:
   i. How well does your dispatch provider respond to changes in your department to update their CAD system, their callout lists, etc? Please provide a representative example.

   ii. Do you receive sufficient updates from your dispatch provider regarding changes in their system, or other operational or technical issues? Please provide a representative example.

4. Closing
   a. Please provide any additional comments or concerns regarding anything not specifically mentioned above.
10. **Appendix 3: NFPA 1221 Major Issues**

The NFPA 1221 Standard, 2010 Edition is produced by the National Fire Protection Association\(^\text{11}\). The standard is 50 pages long and comprises the following 12 sections which are summarized.

1. **Administration**: Defines the scope and purpose of the standard.
2. **Referenced Publications**: Identifies other NFPA standards that are referred to and notes that they form a part of the requirements of the 1221 Standard.
3. **Definitions**: Provides definitions for specific terms and phrases and notes that where these are not defined in the 1221 Standard then a standard meaning applies.
4. **Communications Centres**: Describes the construction of the centres which can be for dispatch and PSAP functions and includes details with regard to exposure hazards, construction, utilities, fire protection, security, power, lighting and lightning.
5. **Communications and Signal Wiring**: Describes features of the electrical and communications such as circuit construction and arrangement, circuit conductors, underground cables, aerial cables and wires, wiring inside buildings, circuit protection, fuses, grounding and access.
6. **Emergency Response Facilities**: Describes the ‘receiving’ end of the dispatch process, for example a fire hall and discusses the general requirements, the need for a commercial telephone, fire protection, power, lighting and communications conductors.
7. **Operations**: Describes the functioning of a dispatch facility and includes comments on management, telecommunicator qualifications and training, staffing, operating procedures, time, recording, and quality assurance/quality improvement.
8. **Telephones**: Describes the telephone receiving equipment including the directory listing, equipment and operations, universal (9-1-1) and emergency number alternate routing.
9. **Dispatching Systems**: Describes the requirements for dispatching systems including wired and radio dispatching systems, radio alerting systems, and outside audible alerting devices.
10. **Computer-Aided Dispatch (CAD) Systems**: Describes all aspects of a CAD system if provided and includes the general requirements, a secondary dispatch method, security, alarm data exchange, CAD capabilities, performance, backup, redundancy, storage network, information transmittal, and mobile data computers.
11. **Testing**: Describes the requirements for testing including general requirements, as well as the requirements for acceptance and operational testing and for the power system.
12. **Records**: Describes all records required for installation, acceptance testing, training records for each employee, operational records, as well as maintenance records and record retention.
13. **Data Network Security**: Describes the requirements for a data security plan, along with testing of the system and the maintenance of records.

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\(^{11}\) www.nfpa.org

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14. Public Alerting Systems: Describes the systems used for public alerting in terms of the procedures for their activation, system security and permitted usage as well as the types of systems that are permitted.
Summary:

1) The purpose of this technical memorandum is to describe the current fire dispatch situation in the Capital Region. This includes communications center facilities, operations, calling statistics, costs and governance as well as voice and data communications facilities used to provide fire dispatch services.

2) Fire dispatch managers for Langford, Saanich and Victoria were interviewed and each of the dispatch facilities was reviewed.

3) Call management data from the Fire CAD systems was obtained and analyzed using the NFPA 1221 standard as the basis for the analysis. Calculated data included response by hour of the day, day of the week, by month as well as the 90th percentile for performance of dispatch tasks within 60 seconds.

4) Extensive documentation from the fire dispatch service providers has been reviewed including training material, standard operational guidelines, failover policies, power supply redundancy, backup plans, etc.

5) Fire dispatch services in the CRD for the most part are improving, but do not yet appear to meet accepted standards and the facilities used are adequate. Exceptions are noted within the report.
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1. Introduction

1.1 Background
This is one of six technical memos being prepared for the CRD during the first stage of a review of 9-1-1 services and fire dispatch in the Capital Region by Planetworks Consulting. The other technical memos cover 9-1-1 fire dispatch standards and developments as well as several benchmark systems operated by other Canadian jurisdictions. A final report will contain options for the CRD based on this work. There are separate technical memos for 9-1-1 and fire dispatch.

1.2 Purpose of this Report
The objective of this is to describe the current fire dispatch situation in the Capital Region. This includes communications center facilities, operations, calling statistics, costs and governance as well as the telecommunications facilities used to provide fire dispatch services.

1.3 Methodology
Information for this baseline assessment was obtained from on-site visits to each of the PSAP’s and each of the fire SSAP’s as well as interviews with communication center managers and staff. Performance data for the fire dispatch operations was obtained from their respective CAD and RMS systems.

The fire dispatch facilities were reviewed on several occasions with a view to determining the technical configuration, the dispatch workstations, overall security of the centre and the ability to provide uninterrupted power as well as the operation of the centre itself.

Training and operational material including policy and guidelines were also reviewed. In addition, a survey of dispatch clients was developed and circulated to determine the degree to which Langford and Saanich clients perceived their dispatch service.1

The issue of the standards of service for fire dispatch is discussed in detail in TM02. Assessment as to the degree to which a fire dispatch service meets these standards requires a careful review of emergency call management data to ensure that fire crews are correctly dispatched within the shortest possible time.

In this review the data analyzed was provided by Langford, Saanich and Victoria. The request was for a minimum of one year’s worth of data, but in the case of Saanich and Victoria, data from 2007 was provided. Langford’s implementation of their current CAD system dates from early 2008 and for that reason, the data supplied begins at that point.

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1 Noted that Victoria does not have dispatch clients other than itself, and so the survey was limited to Langford and Saanich, which do have dispatch clients.

2 The standard is the NFPA 1221—2010 edition.
The data was reviewed to eliminate duplicate calls and analyzed first to determine the number of dispatched incidents in each case. This data was then broken down to determine the overall call volume as well as the distribution by the hour of the day, day of the week and by month.

The initial data set was reviewed with the three service providers and some corrections were noted and it was agreed to review a revised set of data that provided a very good basis for comparison. It should be noted that dispatch and technical personnel at each of the three dispatch providers were extremely helpful and committed to all the requests made of them and this was very much appreciated.

The key performance indicator is the time to complete the dispatch process which equates to 60 seconds or less, 90% of the time. The NFPA standard requires that this be calculated on a monthly basis. The 90th percentile was calculated for all data provided and as noted that for some of the dispatch providers, this was for up to three years.

For the purpose of comparison, a bracket of time between March 2008 and November 2009 was used for the primary comparison, as each agency had data for that period. The data for this period showed that none of the three dispatch providers was able to meet the standard of service, but each showed improvement and were trending in a positive manner.

It should be noted that each of the fire dispatch providers uses a somewhat different configuration of their CAD systems; as well, their workflow is not identical. This is mentioned because the lack of 100% congruence in terms of system configuration and operation means that the data provided is closely comparable, but not identically comparable.

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3 The number of dispatch incidents is separate from the number of units dispatched; the latter is a larger number given that some incident types require the dispatch of multiple units.
2. Fire Dispatch Facilities

2.1 Langford

The Langford Fire Communications Center is located at 2625 Peatt Road, Langford. It is a secondary PSAP (SSAP) which means that it receives 9-1-1 only on a transfer or relay basis from the primary PSAP. Secondary PSAPs serve as answering locations for a particular type of emergency. The center provides fire dispatch services under contract with the Capital Regional District for the following 18 fire departments: Langford, Shirley, North Galiano, Colwood, Port Renfrew, Sooke, Metchosin, Willis Point, East Sooke, View Royal, Salt Spring Island, Piers Island, Highlands, Mayne Island, Saturna Island, Jordan River, North and South Pender Island, Otter Point and South Galiano.

The Communications Center has the capability of staffing 2 call taker – dispatch positions. The dispatchers are cross-trained for call taking and radio dispatching.

Dispatch Consoles

The dispatch consoles are shown in Figure 1 and are fully functional. At some point there should be consideration to upgrading these to sit-to-stand workstations that provide a better ergonomic environment for dispatchers.

Figure 1: Langford Dispatch Console

CAD System

Langford uses a CAD and RMS provided by FDM Software of North Vancouver. This CAD replaced an earlier dispatch application in 2008 and is at or near the most current version of the software. The CAD supports mobile workstations and is capable of managing an interface with BCAS, but at the time the report was being prepared this had not yet been implemented. The CAD is hosted locally and utilizes a mirrored laptop to provide dispatch capability from another
location, should the main dispatch facility become untenable. The Langford CAD system like the Intergraph solution used by Saanich is technically compliant as a contemporary fire CAD. Figures 2 and 3 show the RMS and CAD system screens including mapping.

Figure 2: Langford RMS

Figure 3: Langford CAD Screen with Map

The Langford CAD is also capable of supporting mobile workstation (MWS) units; Figure 4 shows a MWS unit in a Langford unit.
The central office Selective Router has two specialized trunks that are connected to a Nortel Norstar system located at the center. It was installed March 2001 and had a software upgrade in 2008.

The call taker-dispatch positions are using Nortel’s Norstar M7324 telephones with Plantronic headsets. In the dispatch positions there is a Radio to Telephone interface which allows the dispatcher to continue to use the headset and easily switch between the two systems. Langford Fire does not use a Key Set Interface (KSI) to monitor the progress of incoming 9-1-1 calls. Because they only have two 9-1-1 trunks they are using Telus’s split screen option for displaying the ALI information. Figure 5 and 6 show Langford’s emergency and non-emergency phone systems. Figure 7 shows the screen used to display ANI-ALI information.
Figure 5: Langford 9-1-1 Phone Set

Figure 6: Langford Non-emergency Phone Set
Figure 7: Langford Fire--ALI/ANI Display

Administrative Telephone Lines

The Nortel Norstar voice switch is configured to handle regular telephone lines on the system and has Primary Rate Interface (PRI) trunks with Direct In Dial (DID) capability assisting in reducing the call volumes to the main telephone number.

Instant Recall Recorders

Instant Recall Recorders allow the call taker to replay recent conversations in the event that the original conversation could not be understood and must be replayed. An example of this would be a 9-1-1 call where the caller was in a panic and spoke too quickly. The call can be replayed for more clarification. The center currently uses Zetron 3022 for Instant Recall Recorders.

Voice Logger

The Voice Logging equipment records all telephone and radio conversations to be archived. These conversations can be used in a Court of Law as evidence. The logger in use is a Dictaphone voice recorder which was been discontinued by the manufacturer Nice and the policy is to store the information for two years.

Radio

Langford, like Saanich and Victoria Fire is on the CREST radio system. Figure 8 shows the Zetron radio controller for that system.
Langford Fire Back-Up System

Langford Fire does not have a formal back-up agency in the case of an evacuation. They would notify the three CRD PSAP’s and give them their mobile number and provide dispatch using a laptop computer with a mirrored copy of their fire CAD system.

Power Supply

The center is supplied by a diesel generator located in the back of the building which is run once a month. There are individual APS UPS units which are maintained by the City of Langford and have been recently replaced.
Ergonomics

Langford Fire Communications Center has 2 workstations that are not height adjustable. There are two 7/24 dispatch chairs in the center which have recently been changed.

Space for Possible Future Expansion

There is limited space at this Communication Center to accommodate possible future consolidation of 9-1-1 call taking in the CRD.

Issues

At the time the report was being prepared, the Langford dispatch CAD had not yet implemented the BCAS interface for call management of first responder calls. Access to the centre is controlled, but would not meet all of the requirements of the NFPA 1221 standard for security and although the centre is not regularly threatened it remains a concern. The workstations in the dispatch are not sit-to-stand and somewhat dated though they are fully functional.
2.2 Saanich

The Saanich Fire Communications Center is located at 760 Vernon Avenue, Saanich. It is a secondary PSAP which means that it receives 9-1-1 only on transfer or relay basis from the primary PSAP. Secondary PSAPs serve as answering locations for a particular type of emergency. This center directly dispatches Saanich, Oak Bay, Esquimalt, Central Saanich, Sidney and North Saanich fire departments.

The Communications Center has the capability of staffing 4 call taker / dispatch positions and a Supervisory office. The Computer Aided Dispatch (CAD) monitors are on a network-based system with the main processor housed at E-Comm located at 3301 East Pender, Vancouver. In a similar way, Saanich participates with a hosted standard implementation of a Fire Record Management System (RMS) which it provides to its dispatch clients, with servers for this system also located in Vancouver.

The dispatchers are cross-trained for call taking and radio dispatching.

Dispatch Consoles

The dispatch consoles are shown in Figure 10; are new and provide sit-to-stand capability to match the requirements of the dispatchers and to provide an appropriate ergonomic environment.

![Figure 10: Saanich Workstation](image-url)
CAD System

The Saanich Fire Department (SFD) recently replaced its FDM CAD system with an Intergraph system provided by E-Comm. This CAD system went live in Q4 2009 and provides for an electronic interface with the BCAS for first responder calls as well as mobile workstations with GPS. The CAD is hosted in Metro Vancouver and is connected by a primary and a secondary connection. Saanich has also chosen to implement an additional level of redundancy with a mirrored server that can be utilized if either of the links to Vancouver is lost.

The CAD system used by Saanich and its dispatch clients is provided by Intergraph⁴. This system has been developed and implemented with the assistance of E-Comm which hosts the primary and secondary servers. The system utilizes mapping with GPS similar to the Langford system. Figures 11 shows an event screen in the Saanich CAD.

![Figure 11: Saanich CAD Dispatch Screen](image)

Figure 12 shows the Saanich CAD mapping module.

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⁴ Saanich transitioned its CAD from FDM to Intergraph in November 2009; it has retained the FDM record management system.
Figure 12: Saanich CAD Map

Saanich has implemented mobile workstations for apparatus from its own department and others for which it provides service. The mobile workstation units are Data911 units and connectivity with the CAD is maintained by using a commercial wireless carrier. The mobile workstation units have GPS and can be tracked.

Figure 13: Saanich Mobile Workstation
**Telephony**

The Telus central office based Selective Router (SR) in Victoria has three specialized 9-1-1 lines that are connected to a Nortel CS1000 PABX located in the communications center Saanich building. The PABX was installed March 2008. The three specialized trunks run in separate cables and enter the building from separate manholes for redundancy in case of a cable cut.

The central office Selective Router has special software called Automatic Call Distribution (ACD). Saanich Fire has chosen to utilize this network-based software feature to enhance its back-up capability. The three specialized trunks are programmed into the Network ACD queue and each morning the call taker verifies that the trunks are still logged into the queue.

The call taker and dispatch positions are equipped with Nortel Meridian 3904 telephones with M200111 add-ons and Plantronic H91N headsets. In the dispatch positions there is a Radio to Telephone interface which allows the dispatcher to continue to use the headset and easily switch between the two systems. Saanich Fire has installed a Key Set Interface (KSI) to monitor the progress of incoming 9-1-1 calls. The KSI collects the information of the various lines such as the agent position answering the call and the termination of the call. This information is sent to the ALI system for further processing. The KSI has been upgraded from MCK (manufacture discontinued) to ALGO which is now being supported by Telus.

The Saanich non-emergency and emergency phone sets are shown in Figures 14 and 15.

![Saanich Non-emergency Telephone](image)

*Figure 14: Saanich Non-emergency Telephone*
Administrative Telephone Lines

The Nortel CS1000 is configured to handle regular telephone lines on the system and has Primary Rate Interface (PRI) trunks with Direct In Dial (DID) capability, thereby assisting in reducing the call volumes to the main telephone number.

Instant Recall Recorders

Instant Recall Recorders allow the call taker to replay recent conversations in the event that the original conversation could not be understood and must be replayed. An example of this would be a 9-1-1 call where the caller was in a panic and spoke too quickly. The call can be replayed for more clarification. The center currently uses Nice Systems Last Message Replay software for Instant Recall Recorders.

Voice Logger

The Voice Logging equipment records all telephone and radio conversations to be archived. These conversations can be used in a Court of Law as evidence. The logger in use is a Nice voice recorder which was installed in 2008 and the policy is to store the information for two years.

Radio

Saanich like all other fire departments in the CRD utilizes the CREST radio system. Saanich has chosen to implement a Motorola Gold Elite console to manage radio channels in place of the Zetron system used formerly.
Saanich Fire Back-Up System

E-Comm Fire Dispatch in Metro Vancouver is the main back-up for Saanich Fire. If circumstances occurred where Saanich Fire was forced to evacuate, the call taker would log the three 9-1-1 trunks out of the Network ACD queue activating a feature of the ACD software called Night Service which routes calls to a pre-determined location, in this case 9-1-1 trunks to E-Comm Fire Dispatch. Because all three trunks are logged out, a 9-1-1 call relayed from the Saanich PSAP by the Saanich Police call taker would use the network ACD Night Service routing to send the call via the Vancouver SR to E-Comm Fire 9-1-1 trunks.

On answer the E-Comm Fire call taker will receive caller ALI information on the Intergraph CAD screen associated with that call, initiate a fire incident report and call out the appropriate fire department. This process is relatively transparent since E-Comm Fire uses the same network-based Intergraph CAD system\(^5\) as Saanich Fire and also has access to the CREST radio system. The back-up configuration is tested once per month for each shift.

Power Supply

The centers for Saanich Fire and Saanich Police are located in the same building. They share the same UPS and Generator systems. There are also several individual UPS units located in the Saanich Fire dispatch.

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\(^5\) Saanich has also implemented a mirrored server for CAD at its dispatch centre for the unlikely event that connectivity to the host system at E-Comm is lost for any reason.
Figure 17: Saanich Generator/UPS

Air Conditioning

The facility has a central air conditioning/heating system.

Ergonomics

The center has installed 4 Watson workstations that are height adjustable (reducing visual and muscular strain causing fatigue for the Communications call taker) and are equipped with a cable management system for power wiring, monitor screen cables, etc. There are 4 Global Concorde chairs in the center which are varied due to the different requirements of the call takers but are all top-of-the-line 7/24 dispatch chairs.

Space for Possible Future Expansion

There is limited space at this center to accommodate possible future consolidation of 9-1-1 call taking in the CRD.

Issues

There were very few issues that arose in the review of the dispatch centre given that it is very new and was built to be compliant to a high degree with the NFPA 1221 standard.
2.3 Victoria

The Victoria Fire Communications Center is located at 1234 Yates Street and is housed on the apparatus floor. It is a secondary PSAP which means that it receives 9-1-1 only on transfer or relay basis from the primary PSAP. Secondary PSAPs serve as answering locations for a particular type of emergency. The center directly dispatches Victoria Fire.

The center has the capability of staffing 1 call taker–dispatch position. The dispatchers are cross-trained for call taking and radio dispatching.

Dispatch Consoles

Figure 18 shows the left side of the dispatch area, looking toward the front of the fire hall. The various telephone sets are shown for emergency and non-emergency calling, the call check recorder as well as door controls and the ALI-ANI screen. The phone set on the left is a business line phone. The phone set in the centre is for local call management and paging within the fire hall; it also has a speed dial for the Royal Jubilee Hospital. The phone set on the right contains the 9-1-1 lines as well as direct lines to BCAS, the Victoria Police and Saanich Fire.

![Figure 18: VFD Dispatch Console, Left Side](image_url)

Figure 18 shows the Zetron radio console and the FDM CAD/RMS system. A scanner and additional radio units are mounted on the top of the Zetron unit.
CAD System

The CAD system is provided by FDM Software of North Vancouver. The CAD is at or near the current version and has an associated Record Management System (RMS) from the same vendor. Victoria Fire has been a long-time user of CAD but has not to this point chosen to implement the mapping module. CAD mapping provides for a great deal of precision when locating incidents, the calling party’s location and the various incidents that are in progress and it is recommended that VFD implement the map module.

The CAD system tracks each incident the department responds to including the date and time for all related transactions as well as the caller’s name and number where it is available, the number of units that responded and comments entered based on situational updates from the scene, additional information provided by the public, etc.

Figure 20 shows a detailed view of the CAD system working screen. Unlike the other two dispatch centres, the VFD does not utilize CAD-based mapping to show the location of callers and units against the road network and other geographical features.
Figure 20: VFD CAD Screen Detail

Figure 21: VFD's CAD and RMS
Telephony

The call taker-dispatch position is using Nortel’s Meridian 2216 ACD telephone which is connected directly to the Victoria Police PABX using a MCK set extender. This product has been discontinued by the manufacturer. Victoria Fire uses a Key Set Interface (KSI) to monitor the progress of incoming 9-1-1 calls. The KSI has been upgraded from MCK (discontinued) to ALGO which is now being supported by Telus.

Administrative Telephone Lines

The Fire Hall has lines that connect the City’s NEC NEAX2000 PABX switch with PRI trunks. Victoria is considering an upgrade for this system.

Instant Recall Recorders

Instant Recall Recorders allow the call taker to replay recent conversations in the event that the original conversation could not be understood and must be replayed. An example of this would be a 9-1-1 call where the caller was in a panic and spoke too quickly. The call can be replayed for more clarification. The center currently uses CVDS ComLog as the Instant Recall Recorder.

Voice Logger

The Voice Logging equipment records all telephone and radio conversations to be archived. These conversations can be used in a Court of Law as evidence. The logger in use is a ComLog NP72 digital voice recorder manufactured by CVDS and the policy is to store the information for a minimum of one year.

Radio

Victoria, like Langford and Saanich utilizes the CREST radio system for dispatch and operational control. The VFD Zetron console is shown in Figure 19 above.

Victoria Fire Back-Up System

Victoria Fire does not have a defined back-up agency in the case of an evacuation. They would re-locate the dispatcher to the Victoria Police call center and dispatch from a copy of their CAD system at that location.

Power Supply

The center is supplied by a diesel generator (Figure 22) located in the back of the building. It is run once per month. There are individual UPS units which are maintained by the City of Victoria.
Ergonomics

Victoria Fire Communications Center has 1 workstation and it is not height adjustable. There is one 7/24 dispatch chair in the center.

Space for Possible Future Expansion

There is no space at this Communication Center to accommodate possible future expansion without a fundamental reconfiguration and construction of a larger dispatch facility.

Issues

The dispatch facility at Hall #1 could be described as the least compliant with the NFPA standards in terms of the space itself, its security and the technology contained. Concerns include the insecure location with the dispatch area clearly visible from the street and at street level. Also the space within the centre is not ergonomically suitable and much of the equipment within it should be upgraded. The upgrades would include the console and radio control systems, implementation of the mapping module for the CAD as well as in interface with BCAS and the deployment of mobile workstations.
3. Fire Dispatch Statistics

The following section reviews call management for each of the three fire dispatch centers. The review is based on a data set provided by the agencies that was analyzed to understand calls by hour of the day, day of the week as well as by the month and year in addition to the degree to which the agencies were compliant with the NFPA requirement to dispatch within 60 seconds 90% of the time.

There is a detailed explanation of the NFPA standard of service in technical memo 02B. In essence the standard is based on the understanding that fire dispatch is the initial, gating item that determines the point at which fire crews are advised of any emergency incident.

The initial data analysis was provided to each of the three centers for their review prior to its inclusion in the final report. Based on their feedback and clarification regarding a number of issues related to the source of the data, revised data sets were provided and formed the basis for the analysis that follows.

3.1 Langford Fire

The analysis is based on 8,754 incidents between February 2008 and September 2010 which is the period of time since Langford transitioned to an FDM CAD system. The data set provided, contained information for the following elements:

- Caller’s name, phone number and address
- Time and date of the first call
- The first tone time
- First acknowledged, first on route, first on scene, first cleared scene and incident type
- Incident address, fire department responding, apparatus

The call processing time mandated by the NFPA 1221 standard for fire dispatch is 60 seconds 90% of the time. The data set was reviewed and the dispatch interval was calculated as follows:

\[
\text{Dispatch Time} = \text{First Tone Time} - \text{Time of the First Call.}
\]

The data was also reviewed for call volume by month, day of the week and hour of the day.

Calls by Day of the Week

Analysis of the calls dispatched by day of the week display a distribution that is typical of most fire services with a peak of calls at the end of the week. The data is shown in Table 1 with Saturday being the busiest day of the week, approximately 28% busier than the slowest day which is Tuesday.

\[\text{6 Prior to this time Langford operated on a system provided by Municipal Software.}\]
<table>
<thead>
<tr>
<th>Day</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
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<td>Wednesday</td>
<td>1,227</td>
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<tr>
<td>Thursday</td>
<td>1,173</td>
</tr>
<tr>
<td>Friday</td>
<td>1,229</td>
</tr>
<tr>
<td>Saturday</td>
<td>1,348</td>
</tr>
</tbody>
</table>

Table 1: Langford Analysis of Calls by Day of the Week

This information can be graphed as shown in Figure 23. In the case of Langford the busiest day differs from Saanich and Victoria, each of which has Friday as its busiest.

![Langford Dispatch: Calls by DOW](image)

**Figure 23: Langford Graph of calls by Day of the Week**

**Calls by the Hour of the Day**

Calls dispatched by hour of the day are shown in Table 2 and once again this is fairly typical of a fire dispatch center. The busiest hour is from 1700 to 1800 hours; the slowest hour is from 0400 to 0500 hours. In this case the range of calls is much more dramatic with the increase being more than 400%.
Table 2: Langford Calls by Hour of the Day

The curve that identifies the distribution of calls dispatched is shown in Figure 24.

![Langford Dispatch: Calls by Hour](image)

Figure 24: Langford Fire Graph of Calls by Hour of the Day

**Calls by Month**

Call volume can also be analyzed by month as shown in Table 3 to understand how the work load in this centre compares to the others and to understand whether call volume is increasing or not.
<table>
<thead>
<tr>
<th>Year</th>
<th>Dispatched</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar-08</td>
<td>260</td>
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<tr>
<td>Apr-08</td>
<td>248</td>
</tr>
<tr>
<td>May-08</td>
<td>261</td>
</tr>
<tr>
<td>Jun-08</td>
<td>279</td>
</tr>
<tr>
<td>Jul-08</td>
<td>324</td>
</tr>
<tr>
<td>Aug-08</td>
<td>324</td>
</tr>
<tr>
<td>Sep-08</td>
<td>260</td>
</tr>
<tr>
<td>Oct-08</td>
<td>292</td>
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<td>Nov-08</td>
<td>253</td>
</tr>
<tr>
<td>Dec-08</td>
<td>339</td>
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<tr>
<td>Jan-09</td>
<td>241</td>
</tr>
<tr>
<td>Feb-09</td>
<td>253</td>
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<tr>
<td>Mar-09</td>
<td>289</td>
</tr>
<tr>
<td>Apr-09</td>
<td>263</td>
</tr>
<tr>
<td>May-09</td>
<td>316</td>
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<table>
<thead>
<tr>
<th>Year</th>
<th>Dispatched</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jun-09</td>
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<tr>
<td>Jul-09</td>
<td>380</td>
</tr>
<tr>
<td>Aug-09</td>
<td>345</td>
</tr>
<tr>
<td>Sep-09</td>
<td>305</td>
</tr>
<tr>
<td>Oct-09</td>
<td>319</td>
</tr>
<tr>
<td>Nov-09</td>
<td>284</td>
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<tr>
<td>Dec-09</td>
<td>281</td>
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<tr>
<td>Jan-10</td>
<td>245</td>
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<tr>
<td>Feb-10</td>
<td>209</td>
</tr>
<tr>
<td>Mar-10</td>
<td>241</td>
</tr>
<tr>
<td>Apr-10</td>
<td>270</td>
</tr>
<tr>
<td>May-10</td>
<td>236</td>
</tr>
<tr>
<td>Jun-10</td>
<td>276</td>
</tr>
<tr>
<td>Jul-10</td>
<td>353</td>
</tr>
<tr>
<td>Aug-10</td>
<td>334</td>
</tr>
</tbody>
</table>

Table 3: Langford Dispatches by Month

The call volume dispatched by Langford can be graphed as shown in Figure 25 which includes a trend line, and from this it can be seen that although call volume varies by month with peak call volume in the summer that overall, call volume is little changed in more than two years.

Figure 25: Langford Dispatch Volume by Month
90th Percentile

The ability to dispatch calls within 60 seconds 90% of the time is the standard outlined by the NFPA. The standard mandates that the 90th percentile and other statistics be calculated on a monthly basis which is shown in Table 4.

<table>
<thead>
<tr>
<th>Month</th>
<th>90th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar-08</td>
<td>00:03:05</td>
</tr>
<tr>
<td>Apr-08</td>
<td>00:02:37</td>
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<tr>
<td>May-08</td>
<td>00:03:13</td>
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<tr>
<td>Mar-09</td>
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<tr>
<td>Apr-09</td>
<td>00:02:02</td>
</tr>
<tr>
<td>May-09</td>
<td>00:01:41</td>
</tr>
</tbody>
</table>

Table 4: Langford 90th Percentile by Month

What is apparent from this table is that Langford’s success in meeting the 90th percentile has been consistently improving since the first month with the new CAD system. This is better illustrated in the graph in Figure 26.
Figure 26: Langford Graph of 90th Percentile by Month

This graph shows that Langford has steadily improved its 90th percentile for fire dispatch from over 3 minutes April and May 2008 to 2 minutes or below. The trend lines\(^7\) show steady improvement to the present time. There may be a number of reasons for the longer times to dispatch in the second quarter of 2008 including the fact that a new CAD system had just been introduced. For the period measured (27 months) Langford has been at or lower than 2 minutes 60% of the time.

\(^7\) The solid red line represents the linear trend; the dashed black line is a 6 month moving average.
3.2 Saanich Fire Dispatch

The analysis is based on 17,206 incidents between January 1, 2007 and November 19, 2009. Attached are spreadsheets with our dispatch data. All of the information is from the FDM RMS database. The data set provided, contained information for the following elements:

- Callers phone number and address
- Time and date of the first call
- The first unit dispatched
- Incident address, fire department responding, apparatus

The call processing time mandated by the NFPA 1221 standard for fire dispatch is 60 seconds 90% of the time. The data set was reviewed and the dispatch interval was calculated as follows:

\[
\text{Dispatch Time} = \text{First Tone Time} - \text{Time of the First Call.}
\]

The data was also reviewed for call volume by day of the week and hour of the day.

**Calls by Day of the Week**

Analysis of the calls dispatched by day of the week displays a distribution that is typical of most fire services with a peak of calls at the end of the week. The data is shown in Table 5, with Friday being the busiest day of the week, approximately 8% busier than the slowest day which is Tuesday.

<table>
<thead>
<tr>
<th>Day</th>
<th>Count</th>
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<td>Sunday</td>
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<td>Monday</td>
<td>2,423</td>
</tr>
<tr>
<td>Tuesday</td>
<td>2,383</td>
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<tr>
<td>Wednesday</td>
<td>2,387</td>
</tr>
<tr>
<td>Thursday</td>
<td>2,423</td>
</tr>
<tr>
<td>Friday</td>
<td>2,563</td>
</tr>
<tr>
<td>Saturday</td>
<td>2,438</td>
</tr>
</tbody>
</table>

**Table 5: Saanich Analysis of Calls by Day of the Week**

This information can be graphed as shown in Figure 27 which illustrates a significant up-tick in call volume on Fridays. This is similar to Victoria which also has its high call volume on Fridays.
Calls by the hour of the day

Calls dispatched by hour of the day are shown in Table 6 and once again this is fairly typical of a fire dispatch center. The busiest hours are from 1000 to 1100 hours and from 1600 to 1700 hours; the slowest hour is from 0400 to 0500 hours. In this case the range of calls is significant with the increase being more than 300%. 

Figure 27: Saanich Graph of Calls by Day of the Week
The distribution of calls by hour of the day in Figure 28 shows the two peak periods of mid-day and the afternoon rush hour.

![Saanich Dispatch: Calls by Hour](image)

**Table 6: Saanich Calls by Hour of the Day**

<table>
<thead>
<tr>
<th>Hour</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000 hours</td>
<td>505</td>
</tr>
<tr>
<td>0100 hours</td>
<td>458</td>
</tr>
<tr>
<td>0200 hours</td>
<td>387</td>
</tr>
<tr>
<td>0300 hours</td>
<td>342</td>
</tr>
<tr>
<td>0400 hours</td>
<td>302</td>
</tr>
<tr>
<td>0500 hours</td>
<td>323</td>
</tr>
<tr>
<td>0600 hours</td>
<td>392</td>
</tr>
<tr>
<td>0700 hours</td>
<td>612</td>
</tr>
<tr>
<td>0800 hours</td>
<td>797</td>
</tr>
<tr>
<td>0900 hours</td>
<td>921</td>
</tr>
<tr>
<td>1000 hours</td>
<td>974</td>
</tr>
<tr>
<td>1100 hours</td>
<td>958</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hour</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200 hours</td>
<td>955</td>
</tr>
<tr>
<td>1300 hours</td>
<td>922</td>
</tr>
<tr>
<td>1400 hours</td>
<td>915</td>
</tr>
<tr>
<td>1500 hours</td>
<td>963</td>
</tr>
<tr>
<td>1600 hours</td>
<td>973</td>
</tr>
<tr>
<td>1700 hours</td>
<td>969</td>
</tr>
<tr>
<td>1800 hours</td>
<td>856</td>
</tr>
<tr>
<td>1900 hours</td>
<td>840</td>
</tr>
<tr>
<td>2000 hours</td>
<td>766</td>
</tr>
<tr>
<td>2100 hours</td>
<td>731</td>
</tr>
<tr>
<td>2200 hours</td>
<td>615</td>
</tr>
<tr>
<td>2300 hours</td>
<td>565</td>
</tr>
</tbody>
</table>

**Figure 28: Saanich Graph of Calls by Hour of the Day**
Dispatched Calls by Month

The distribution of calls by month is shown in Table 7 and this data appears to indicate an increase in call volume over the time surveyed.

<table>
<thead>
<tr>
<th>Year</th>
<th>Dispatches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-07</td>
<td>438</td>
</tr>
<tr>
<td>Feb-07</td>
<td>380</td>
</tr>
<tr>
<td>Mar-07</td>
<td>404</td>
</tr>
<tr>
<td>Apr-07</td>
<td>414</td>
</tr>
<tr>
<td>May-07</td>
<td>391</td>
</tr>
<tr>
<td>Jun-07</td>
<td>402</td>
</tr>
<tr>
<td>Jul-07</td>
<td>522</td>
</tr>
<tr>
<td>Aug-07</td>
<td>441</td>
</tr>
<tr>
<td>Sep-07</td>
<td>464</td>
</tr>
<tr>
<td>Oct-07</td>
<td>536</td>
</tr>
<tr>
<td>Nov-07</td>
<td>450</td>
</tr>
<tr>
<td>Dec-07</td>
<td>493</td>
</tr>
<tr>
<td>Jan-08</td>
<td>457</td>
</tr>
<tr>
<td>Feb-08</td>
<td>479</td>
</tr>
<tr>
<td>Mar-08</td>
<td>518</td>
</tr>
<tr>
<td>Apr-08</td>
<td>426</td>
</tr>
<tr>
<td>May-08</td>
<td>451</td>
</tr>
<tr>
<td>Jun-08</td>
<td>422</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Dispatches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jul-08</td>
<td>474</td>
</tr>
<tr>
<td>Aug-08</td>
<td>464</td>
</tr>
<tr>
<td>Sep-08</td>
<td>552</td>
</tr>
<tr>
<td>Oct-08</td>
<td>525</td>
</tr>
<tr>
<td>Nov-08</td>
<td>561</td>
</tr>
<tr>
<td>Dec-08</td>
<td>656</td>
</tr>
<tr>
<td>Jan-09</td>
<td>507</td>
</tr>
<tr>
<td>Feb-09</td>
<td>478</td>
</tr>
<tr>
<td>Mar-09</td>
<td>579</td>
</tr>
<tr>
<td>Apr-09</td>
<td>529</td>
</tr>
<tr>
<td>May-09</td>
<td>536</td>
</tr>
<tr>
<td>Jun-09</td>
<td>524</td>
</tr>
<tr>
<td>Jul-09</td>
<td>579</td>
</tr>
<tr>
<td>Aug-09</td>
<td>508</td>
</tr>
<tr>
<td>Sep-09</td>
<td>570</td>
</tr>
<tr>
<td>Oct-09</td>
<td>580</td>
</tr>
<tr>
<td>Nov-09</td>
<td>496</td>
</tr>
</tbody>
</table>

Table 7: Saanich Dispatches by Month

The dispatch data is shown with a trend line in Figure 29 and this confirms that compared to Langford which has a steady call volume that Saanich’s dispatch centre is managing a fairly significant increase in calls.
Figure 29: Saanich Dispatch Volume by Month

90th Percentile

The ability to dispatch calls within 60 seconds 90% of the time is the standard outlined by the NFPA. The standard mandates that the 90th percentile and other statistics be calculated on a monthly basis; the 90th percentile is shown in the Table 8.

<table>
<thead>
<tr>
<th>Month</th>
<th>90th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-07</td>
<td>0:01:55</td>
</tr>
<tr>
<td>Feb-07</td>
<td>0:02:03</td>
</tr>
<tr>
<td>Mar-07</td>
<td>0:01:49</td>
</tr>
<tr>
<td>Apr-07</td>
<td>0:01:56</td>
</tr>
<tr>
<td>May-07</td>
<td>0:01:56</td>
</tr>
<tr>
<td>Jun-07</td>
<td>0:01:52</td>
</tr>
<tr>
<td>Jul-07</td>
<td>0:01:57</td>
</tr>
<tr>
<td>Aug-07</td>
<td>0:01:55</td>
</tr>
<tr>
<td>Sep-07</td>
<td>0:02:02</td>
</tr>
<tr>
<td>Oct-07</td>
<td>0:01:46</td>
</tr>
<tr>
<td>Nov-07</td>
<td>0:02:04</td>
</tr>
<tr>
<td>Dec-07</td>
<td>0:01:40</td>
</tr>
<tr>
<td>Jan-08</td>
<td>0:00:57</td>
</tr>
<tr>
<td>Feb-08</td>
<td>0:01:39</td>
</tr>
<tr>
<td>Mar-08</td>
<td>0:01:47</td>
</tr>
<tr>
<td>Apr-08</td>
<td>0:01:55</td>
</tr>
<tr>
<td>May-08</td>
<td>0:01:56</td>
</tr>
<tr>
<td>Jun-08</td>
<td>0:02:08</td>
</tr>
<tr>
<td>Jul-08</td>
<td>0:02:03</td>
</tr>
<tr>
<td>Aug-08</td>
<td>0:02:14</td>
</tr>
<tr>
<td>Sep-08</td>
<td>0:02:03</td>
</tr>
<tr>
<td>Oct-08</td>
<td>0:02:03</td>
</tr>
<tr>
<td>Nov-08</td>
<td>0:01:56</td>
</tr>
<tr>
<td>Dec-08</td>
<td>0:01:53</td>
</tr>
<tr>
<td>Jan-09</td>
<td>0:01:47</td>
</tr>
<tr>
<td>Feb-09</td>
<td>0:01:47</td>
</tr>
<tr>
<td>Mar-09</td>
<td>0:01:40</td>
</tr>
<tr>
<td>Apr-09</td>
<td>0:01:52</td>
</tr>
</tbody>
</table>
Table 8: Saanich 90th Percentile by Month

What is apparent from this table is that Saanich has been very consistent in terms of their performance though not meeting the standard. This is illustrated in Figure 30.

<table>
<thead>
<tr>
<th>Month</th>
<th>90th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>May-09</td>
<td>0:01:51</td>
</tr>
<tr>
<td>Jun-09</td>
<td>0:02:17</td>
</tr>
<tr>
<td>Jul-09</td>
<td>0:01:58</td>
</tr>
<tr>
<td>Aug-09</td>
<td>0:01:58</td>
</tr>
<tr>
<td>Sep-09</td>
<td>0:01:54</td>
</tr>
<tr>
<td>Oct-09</td>
<td>0:01:52</td>
</tr>
<tr>
<td>Nov-09</td>
<td>0:01:43</td>
</tr>
</tbody>
</table>

Figure 30: Saanich Graph of 90th Percentile by Month

This graph shows that Saanich’s 90th percentile has been at or below 2 minutes 26 out of 35 months, or 74% of the time. The trend lines\(^8\) show very consistent performance throughout the nearly 3 years of data.

\(^8\) The solid red line represents the linear trend, the dashed black line is a 6 month moving average.
3.3 Victoria Fire

The analysis is based on 13,041 incidents between January 1, 2007 and December 31, 2009. All of the information is from the FDM RMS database. The data set provided, contained information for the following elements:

- Callers number and address
- Time and date of the first call
- The first unit dispatched
- Incident address, fire department responding, apparatus

The call processing time mandated by the NFPA 1221 standard for fire dispatch is 60 seconds 90% of the time. The data set was reviewed and the dispatch interval was calculated as follows:

\[
\text{Dispatch Time} = \text{Dispatch} - \text{Incident Begin Time}.\]

The data was also reviewed for call volume by day of the week and hour of the day.

Calls by Day of the Week

Analysis of the calls dispatched by day of the week display a distribution that is typical of most fire services with a peak of calls at the end of the week. The data is shown in Table 9 and Figure 31, with Friday being the busiest day of the week, approximately 11% busier than the slowest day which is Sunday.

<table>
<thead>
<tr>
<th>Day</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
<td>1,831</td>
</tr>
<tr>
<td>Monday</td>
<td>1,873</td>
</tr>
<tr>
<td>Tuesday</td>
<td>1,891</td>
</tr>
<tr>
<td>Wednesday</td>
<td>1,920</td>
</tr>
<tr>
<td>Thursday</td>
<td>1,915</td>
</tr>
<tr>
<td>Friday</td>
<td>2,025</td>
</tr>
<tr>
<td>Saturday</td>
<td>1,946</td>
</tr>
</tbody>
</table>

Table 9: Victoria Analysis of Calls by Day of the Week
Calls by the Hour of the Day

Calls dispatched by hour of the day are shown in Table 10 and once again this is fairly typical of a fire dispatch center. The busiest hour is from 1100 to 1200 hours; the slowest hour is from 0400 to 0500 hrs. In this case the range of calls is significant with the increase being more than 350%.

<table>
<thead>
<tr>
<th>Hour</th>
<th>Count</th>
<th>Hour</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000 hours</td>
<td>427</td>
<td>1200 hours</td>
<td>795</td>
</tr>
<tr>
<td>0100 hours</td>
<td>355</td>
<td>1300 hours</td>
<td>763</td>
</tr>
<tr>
<td>0200 hours</td>
<td>384</td>
<td>1400 hours</td>
<td>724</td>
</tr>
<tr>
<td>0300 hours</td>
<td>295</td>
<td>1500 hours</td>
<td>731</td>
</tr>
<tr>
<td>0400 hours</td>
<td>248</td>
<td>1600 hours</td>
<td>790</td>
</tr>
<tr>
<td>0500 hours</td>
<td>240</td>
<td>1700 hours</td>
<td>741</td>
</tr>
<tr>
<td>0600 hours</td>
<td>295</td>
<td>1800 hours</td>
<td>737</td>
</tr>
<tr>
<td>0700 hours</td>
<td>454</td>
<td>1900 hours</td>
<td>624</td>
</tr>
<tr>
<td>0800 hours</td>
<td>605</td>
<td>2000 hours</td>
<td>610</td>
</tr>
<tr>
<td>0900 hours</td>
<td>701</td>
<td>2100 hours</td>
<td>542</td>
</tr>
<tr>
<td>1000 hours</td>
<td>656</td>
<td>2200 hours</td>
<td>507</td>
</tr>
<tr>
<td>1100 hours</td>
<td>709</td>
<td>2300 hours</td>
<td>468</td>
</tr>
</tbody>
</table>

Table 10: Victoria Calls by Hour of the Day
The data in table 10 can be graphed as shown in Figure 32 which shows the same peaks in call volume at noon and then later during the afternoon rush hour.

![Victoria Fire: Calls by Hour](image)

**Figure 32: Victoria Graph of Calls by Hour of the Day**

**Incidents Dispatched by Month**

The number of calls dispatch for Victoria is shown in Table 11. This indicates that over the time surveyed that the call volume has been reasonably steady, with a tendency towards a slight reduction.

<table>
<thead>
<tr>
<th>Month</th>
<th>Count</th>
<th>Month</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-07</td>
<td>426</td>
<td>Dec-07</td>
<td>394</td>
</tr>
<tr>
<td>Feb-07</td>
<td>334</td>
<td>Jan-08</td>
<td>358</td>
</tr>
<tr>
<td>Mar-07</td>
<td>372</td>
<td>Feb-08</td>
<td>356</td>
</tr>
<tr>
<td>Apr-07</td>
<td>337</td>
<td>Mar-08</td>
<td>368</td>
</tr>
<tr>
<td>May-07</td>
<td>427</td>
<td>Apr-08</td>
<td>359</td>
</tr>
<tr>
<td>Jun-07</td>
<td>361</td>
<td>May-08</td>
<td>385</td>
</tr>
<tr>
<td>Jul-07</td>
<td>414</td>
<td>Jun-08</td>
<td>362</td>
</tr>
<tr>
<td>Aug-07</td>
<td>399</td>
<td>Jul-08</td>
<td>369</td>
</tr>
<tr>
<td>Sep-07</td>
<td>391</td>
<td>Aug-08</td>
<td>389</td>
</tr>
<tr>
<td>Oct-07</td>
<td>444</td>
<td>Sep-08</td>
<td>369</td>
</tr>
<tr>
<td>Nov-07</td>
<td>352</td>
<td>Oct-08</td>
<td>358</td>
</tr>
<tr>
<td>Month</td>
<td>Count</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov-08</td>
<td>351</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec-08</td>
<td>411</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan-09</td>
<td>376</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feb-09</td>
<td>324</td>
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</tr>
<tr>
<td>Mar-09</td>
<td>361</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apr-09</td>
<td>391</td>
<td></td>
<td></td>
</tr>
<tr>
<td>May-09</td>
<td>349</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jun-09</td>
<td>367</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jul-09</td>
<td>393</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aug-09</td>
<td>367</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sep-09</td>
<td>361</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-09</td>
<td>351</td>
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</tr>
<tr>
<td>Nov-09</td>
<td>357</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec-09</td>
<td>318</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 11: Victoria Dispatches by Month

The trend for incidents dispatched by Victoria Fire is shown in Figure 33 which illustrates a moderate decline in monthly call volume over the period surveyed.

![Victoria Fire: Incidents per Month](image)

**Figure 33: Victoria Dispatch Volume by Month**

**90th Percentile**

The ability to dispatch calls within 60 seconds 90% of the time is the standard outlined by the NFPA. The standard mandates that the 90th percentile and other statistics be calculated on a monthly basis; the 90th percentile is shown in Table 12.
<table>
<thead>
<tr>
<th>Month</th>
<th>90th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-07</td>
<td>0:01:10</td>
</tr>
<tr>
<td>Feb-07</td>
<td>0:01:17</td>
</tr>
<tr>
<td>Mar-07</td>
<td>0:01:23</td>
</tr>
<tr>
<td>Apr-07</td>
<td>0:01:18</td>
</tr>
<tr>
<td>May-07</td>
<td>0:01:24</td>
</tr>
<tr>
<td>Jun-07</td>
<td>0:01:19</td>
</tr>
<tr>
<td>Jul-07</td>
<td>0:01:20</td>
</tr>
<tr>
<td>Aug-07</td>
<td>0:01:04</td>
</tr>
<tr>
<td>Sep-07</td>
<td>0:01:09</td>
</tr>
<tr>
<td>Oct-07</td>
<td>0:01:25</td>
</tr>
<tr>
<td>Nov-07</td>
<td>0:01:12</td>
</tr>
<tr>
<td>Dec-07</td>
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</tr>
<tr>
<td>Jan-08</td>
<td>0:01:29</td>
</tr>
<tr>
<td>Feb-08</td>
<td>0:01:25</td>
</tr>
<tr>
<td>Mar-08</td>
<td>0:01:22</td>
</tr>
<tr>
<td>Apr-08</td>
<td>0:01:05</td>
</tr>
<tr>
<td>May-08</td>
<td>0:01:13</td>
</tr>
<tr>
<td>Jun-08</td>
<td>0:01:06</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Month</th>
<th>90th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jul-08</td>
<td>0:01:10</td>
</tr>
<tr>
<td>Aug-08</td>
<td>0:01:00</td>
</tr>
<tr>
<td>Sep-08</td>
<td>0:01:24</td>
</tr>
<tr>
<td>Oct-08</td>
<td>0:01:43</td>
</tr>
<tr>
<td>Nov-08</td>
<td>0:01:25</td>
</tr>
<tr>
<td>Dec-08</td>
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<td>Jan-09</td>
<td>0:01:21</td>
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<td>Mar-09</td>
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<td>Apr-09</td>
<td>0:01:24</td>
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<tr>
<td>May-09</td>
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<tr>
<td>Jun-09</td>
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<tr>
<td>Jul-09</td>
<td>0:01:54</td>
</tr>
<tr>
<td>Aug-09</td>
<td>0:01:39</td>
</tr>
<tr>
<td>Sep-09</td>
<td>0:01:43</td>
</tr>
<tr>
<td>Oct-09</td>
<td>0:01:29</td>
</tr>
<tr>
<td>Nov-09</td>
<td>0:01:17</td>
</tr>
<tr>
<td>Dec-09</td>
<td>0:01:23</td>
</tr>
</tbody>
</table>

**Table 12: Victoria 90th Percentile by Month**

What is apparent from this table is that Victoria has been reasonably consistent in terms of their performance however call processing times are increasing. This is illustrated in the following Figure 34.
This graph shows that Victoria’s 90th percentile has been at or below 2 minutes 100% of the time. The trend lines show that overall, performance is declining throughout the 3 years of data, that is the times to complete the dispatch are increasing by in the range of 30 seconds over the period surveyed.

---

9 The solid red line represents the linear trend; the dashed black line is a 6 month moving average.
3.4 Data Comparison Langford, Saanich, Victoria

90th Percentile

There are a number of ways to examine the dispatch data from Langford, Saanich and Victoria. The most important accepted measure is the call turnover time or dispatch time. The NFPA standard proposes that calls be dispatched within 60 seconds, 90% of the time measured on a monthly basis.

The graph in Figure 35 illustrates the comparative success of the three dispatch centers in meeting this test, from January 2007 forward. The previous sections have reviewed the dispatch performance of each dispatch center separately. Figure 35 portrays the data for each department allowing a comparison between them. The goal of 1 minute identified in the NFPA standard is shown in the solid red line for comparison.

Figure 35: Graph of 90th Percentile: January 2007 to July 2010

The data set is not complete for all three departments for reasons noted previously. There is however enough data to illustrate the differences between the three centers. Specifically it appears that Langford had times that were well outside of the performance requirements but that their performance has been improving and for the final months of the data set their compliance is approaching Saanich and Victoria.

Saanich Fire has been consistent when measured against the standard, though it is still outside of the NFPA goal for all months with the exception of one. Victoria Fire appears to have been
reasonably consistent with a slightly wider range than Saanich and is trending slightly upward over the period of time surveyed.

Figure 36 shows the performance of the three centres for the period when all 3 had data and for the final 5 to 6 months in the latter part of 2009 each is showing an improvement.

![3 Centres: 90th Percentile; Target = 0:01:00](image)

**Figure 36: 3 Centres, 90th Percentile March 2008 to November 2009**

**Monthly Call Volume**

The monthly call volume between January 2007 and May 2010 is illustrated in Figure 37. This graph is helpful in understanding some of the reasons for the variance in the 90th percentile especially when compared to the level of staffing. This graph shows that Victoria’s call volume is approximately 30% higher than that of Langford when calculated on a monthly basis; at the same time, their staffing is the same, with one dispatcher per shift on a regular basis.

Saanich has a call volume that is larger than Langford or Victoria and is nearly half of the call volume in the CRD. Saanich has recently adopted a model with two dispatchers on duty on a regular basis.
Figure 37: Monthly Call Volume: Langford, Saanich, Victoria

The relative share of call volume for the period of comparable data is shown in Table 13.

<table>
<thead>
<tr>
<th>Year/Month</th>
<th>Saanich</th>
<th>Victoria</th>
<th>Langford</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2008</td>
<td>45%</td>
<td>32%</td>
<td>23%</td>
</tr>
<tr>
<td>April 2008</td>
<td>41%</td>
<td>35%</td>
<td>24%</td>
</tr>
<tr>
<td>May 2008</td>
<td>41%</td>
<td>35%</td>
<td>24%</td>
</tr>
<tr>
<td>June 2008</td>
<td>40%</td>
<td>34%</td>
<td>26%</td>
</tr>
<tr>
<td>July 2008</td>
<td>41%</td>
<td>32%</td>
<td>28%</td>
</tr>
<tr>
<td>August 2008</td>
<td>39%</td>
<td>33%</td>
<td>28%</td>
</tr>
<tr>
<td>September 2008</td>
<td>47%</td>
<td>31%</td>
<td>22%</td>
</tr>
<tr>
<td>October 2008</td>
<td>45%</td>
<td>30%</td>
<td>25%</td>
</tr>
<tr>
<td>November 2008</td>
<td>48%</td>
<td>30%</td>
<td>22%</td>
</tr>
<tr>
<td>December 2008</td>
<td>47%</td>
<td>29%</td>
<td>24%</td>
</tr>
<tr>
<td>January 2009</td>
<td>45%</td>
<td>33%</td>
<td>21%</td>
</tr>
<tr>
<td>Year/Month</td>
<td>Saanich</td>
<td>Victoria</td>
<td>Langford</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>February 2009</td>
<td>45%</td>
<td>31%</td>
<td>24%</td>
</tr>
<tr>
<td>March 2009</td>
<td>47%</td>
<td>29%</td>
<td>24%</td>
</tr>
<tr>
<td>April 2009</td>
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<td>33%</td>
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<tr>
<td>October 2009</td>
<td>46%</td>
<td>28%</td>
<td>26%</td>
</tr>
<tr>
<td>November 2009</td>
<td>44%</td>
<td>31%</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>44%</td>
<td>31%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Table 13: Percentage of Call Volume by Centre

The pie chart in Figure 38 illustrates the balance of calls dispatched between the three centres, and as noted previously call volume managed by Saanich is increasing, for Langford it is steady and for Victoria is showing a decrease.

Figure 38: 3 Centres: Percentage of Calls Dispatched
4. Fire Dispatch Agreements and Services

4.1 Dispatch Agreements

The issue of the standards of service for fire dispatch are becoming well understood. These standards are reviewed in detail in Technical Memo 02B and increasingly these are being reflected in dispatch contracts to manage risk and to quantify the service provided for the clients.

Considering the NFPA 1221 standard and comparable best practices it is recommended that all future contracts for fire dispatch include provisions that require the dispatch provider to commit to monthly reporting regarding their ability to complete the dispatch process within 60 seconds, 90% of the time. The dispatch provider in concert with the PSAP should also provide monthly reporting with regard to completing the transfer of a caller from 9-1-1 to the fire agency within 30 seconds 95% of the time, and for the fire dispatchers to answer the 9-1-1 call within 15 seconds 95% of the time. The dispatch provider should also outline their strategy to demonstrate compliance with all aspects of the NFPA 1221 and in particular should provide detailed documentation regarding their complete business continuity strategy as well as their dispatch training and management and quality assurance.

4.2 Fire Dispatch Issues and Trends

The three dispatch facilities were reviewed in the previous sections. By way of a summary the following points can be made:

1. No fire dispatch center consistently meets the NFPA standard though for the final period reviewed, performance appears to be improving and the degree of difference between the providers is relatively small.

2. Dispatch managers and staff in each centre are aware of the goal to achieve the NFPA standards and are actively pursuing solutions to this end.

3. Saanich has a back up strategy utilizing another fire dispatch centre that is tested monthly. Victoria uses Victoria Police as a back up centre. Langford utilizes mobile laptops to relocate to a safe location for their back up. All three systems are satisfactory. Each center has a detailed training manual as well as standard operating guidelines.

4. The Saanich CAD is the only one with an interface with BCAS at the time the report was prepared; the CAD used by Langford and Victoria is compatible with such an interface and it is expected this will be implemented shortly.

5. The CAD systems for each center are at or near the most recent version of software.

6. Mobile workstations have been deployed in Langford and Saanich; they are planned to be deployed with Victoria in the future. Regardless, the CAD used by each fire dispatch provider is compatible with mobile workstations.

7. The Saanich and Langford dispatch centers are configured for a minimum of two dispatchers; Victoria is restricted to a single dispatcher.
8. The dispatchers in each center when we observed them were very clear about their mandate and appeared to be very aware of the technology and procedures; at all times they were professional and focused on their assignment.

9. The Saanich center is the most secure and probably comes the closest to meeting the majority of the NFPA 1221 standards for wiring, security, redundancy, etc. Langford would be the second most compliant, Victoria third.

4.2.1 Fire Chief Survey

Langford’s dispatch clients were surveyed using the questionnaire shown in Appendix 1. A total of 8 fire departments responded out of 19 for a completion rate of 42%. Opinions regarding the service ranged, and in general the volunteer fire departments were very pleased with the level of dispatch provided, while career/composite departments were somewhat more critical of the call relay service as not meeting their needs.

In terms of potential improvements that could be made, the ability to fully link the dispatch information with the incident record for the department was noted as needing improvement. The update of department information into the dispatch CAD system on a more regular basis was identified; also the need to work to clarify response boundaries which were described as incorrect at times.

The capability of dispatch personnel was also reviewed and the larger departments by call volume noted that it is sometimes inconsistent, and during busy periods they do not get full radio support however it should be noted that this may not be covered by the contract with the CRD which specifies a call relay system. The survey also confirmed that there has been a steady improvement over time.

A number of the fire chiefs also identified a need for a greater level of involvement with the 9-1-1 process in general. They outlined concerns regarding 9-1-1 call management and triage which in their view should assign different call types and specifically Motor Vehicle Incidents to the fire department first. This issue could be addressed by having a fire service representative on the committee that deal with 9-1-1 issues.

There was also discussion regarding the dispute resolution model with Langford noting that it needs improvement. A number of the fire chiefs propose a more regular basis for meeting including a more immediate response to issues raised although once again it is noted this has been improving in the past year. This may be made part of a longer-term business plan which was also proposed.

Saanich’s dispatch clients were also surveyed, using the identical questionnaire. A total of 7 fire departments out of 7 responded to the survey for a completion rate of 100%. The opinions with regard to the professionalism of the staff were completely positive with the service provided meeting the clients’ needs. Smaller departments commented favourably regarding the ‘full dispatch service’ while at the same time noting that their particular local requirements were satisfied.
One department commented that the network connection for the fire RMS was slower than desired while another noted that the speed of the rip & run printer should be faster than is currently the case.

A number of the fire chiefs commented on the need to review the 9-1-1 protocol to ensure that calls such as motor vehicle accidents and others be provided to the fire dispatchers earlier than is presently the case. This is similar to the comments from the Langford dispatch clients and this could be addressed by providing additional fire chief participation with the regular 9-1-1 review process.

With regard to the use of the radio system one of the fire chiefs noted that the issue of the number of radio channels/talk groups in the CREST system should be reviewed to provide for channels that could be assigned regionally for mutual aid calls. At the present time it appears that some fire departments are required to switch channels on route to such mutual aid calls, and this has the potential for miscommunication and error.
5. **Summary of Findings**

Fire dispatch within the CRD is provided by three fire departments: Langford, Saanich and Victoria. Saanich has the highest call volume of the three, followed by Victoria and Langford in descending order.

The standard by which fire dispatch services are measured is provided by the NFPA 1221—2010 which was the basis for the current review. One of the most critical components of fire dispatching is the need to perform the call management as quickly and accurately as possible. When measured against this test, none of the dispatch agencies achieves the goal of completing the dispatch process in 60 seconds, 90% of the time measured on a monthly basis.

What can be said is that each is within a band of benchmark agencies in BC, Alberta and Ontario and is improving their ability over time. One caution in terms of comparing dispatch performance based on the data is the no two centres have their systems configured in an identical manner; nor does each have similar system functionality such as the interface from BCAS, mobile workstations, etc.

When considering the technical and security configuration of each of the three centres, Saanich’s is the most secure for a number of reasons including its location in a post-disaster space, tightly controlled access, sit to stand workstations, cable diversity, etc. Langford has taken considerable steps to improve its facility and could be considered the second most compliant. Victoria’s centre is the least secure and is in the greatest need of modernization.

Finally, the personnel in each centre are aware of the need to perform their duties as quickly and accurately as possible. Their training and operational policies are consistent with this and a greater awareness of the service being provided and their actual dispatch metrics will continue to drive their improvement. At all times they appeared professional and competent.
6. Glossary of Terms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ADSL</td>
<td>Asymmetric Digital Subscriber Line</td>
</tr>
<tr>
<td>ALI</td>
<td>Automatic Location Identification</td>
</tr>
<tr>
<td>ANI</td>
<td>Automatic Number Identification</td>
</tr>
<tr>
<td>APCO</td>
<td>Association of Public Safety Communications Officials</td>
</tr>
<tr>
<td>ASP</td>
<td>Access Service Provider</td>
</tr>
<tr>
<td>CAD</td>
<td>Computer Aided Dispatch</td>
</tr>
<tr>
<td>CRTC</td>
<td>Canadian Radio-Television and Telecommunications Commission</td>
</tr>
<tr>
<td>E9-1-1</td>
<td>Enhanced 9-1-1</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>IP</td>
<td>Internet Protocol</td>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Association</td>
</tr>
<tr>
<td>PIR</td>
<td>PSAP Initiated Request</td>
</tr>
<tr>
<td>PSAP</td>
<td>Public Safety Answering Point</td>
</tr>
<tr>
<td>SSAP</td>
<td>Secondary Safety Answering Point</td>
</tr>
<tr>
<td>UPS</td>
<td>Uninterruptable Power Supply</td>
</tr>
</tbody>
</table>
7. **Appendix 1: Fire Chief Survey**

CRD 911 and Fire Dispatch Review

Fire Dispatch Questionnaire

The following questionnaire is designed to provide an opportunity for you, on behalf of your fire department to comment on the dispatch service you receive. Please provide as much information as you feel appropriate including what works well, and what you feel might be improved.

1. Please forward the completed questionnaire, either by email to dwmitchell@telus.net; or by fax to 1-604-552-8951

2. If you wish to discuss any of these issues further, please either
   - a. Phone at 1-604-812-8951, or
   - b. Email your additional comments to dwmitchell@telus.net

Questionnaire

1. Survey completed by:
   - a. Name: __________________________
   - b. Fire Department ___________________
   - c. Do you wish the undersigned to contact you to discuss any aspect of dispatch: ______

2. Please provide your comments regarding your overall impression of your fire dispatch service
   - a. What works well in your opinion?
   - b. What requires improvement?

3. Dispatch Information
   - a. When you are dispatched to an incident either by page, radio, tone-out or phone call:
      - i. Is the information provided by the dispatch service complete? If not, can you provide an example?
ii. If not, what is generally missing, and why is this important to you?

iii. Is the dispatch information you receive correct; if not can you provide an example?

iv. If you could change just one thing to improve the dispatch process, what would it be?

v. Please provide any further comment regarding the dispatch process.

b. When you are responding to an incident or operating at the scene:

i. Are you satisfied with your ability to contact a dispatcher to receive additional information, to request additional support, etc? Can you give a representative example?

ii. Is there a service or support that you would like to receive while on route or at the scene that you do not currently receive? If so, please provide details.

iii. When you attempt to contact your dispatch, is their response timely? Can you provide a representative example?

c. Post Incident:

i. Do you receive sufficient incident details to complete your reporting or journal entries? If not, what additional data should be provided?

d. Service overall:

i. How well does your dispatch provider respond to changes in your department to update their CAD system, their callout lists, etc? Please provide a representative example.

ii. Do you receive sufficient updates from your dispatch provider regarding changes in their system, or other operational or technical issues? Please provide a representative example.

4. Closing

Please provide any additional comments or concerns regarding anything not specifically ment
8. Appendix 2: References


Summary: This technical memo describes current standards as well as technical and regulatory developments that will affect fire dispatch call centres and operations in Canada. It also describes typical funding and governance models. These factors will be considered in developing options to be considered by CRD.

Distribution: Travis Whiting CRD
Planetworks Project Team
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Introduction

1.1 Background

This is one of six technical memos being prepared for CRD during the first stage of a review of 9-1-1 services and fire dispatch in the Capital Region. Other technical memos will fully describe the current 9-1-1 and dispatch situation in CRD and other 9-1-1 "benchmark" systems. A final report will contain options for CRD based on this work. There are separate technical memos for 9-1-1 and fire dispatch.

1.2 Purpose of this Report

The purpose of this technical memo is to describe current standards as well as technical and regulatory developments that will affect fire dispatch operations in Canada. It also describes typical funding and governance models. These factors will be considered in developing options for consideration by CRD.

1.3 Methodology

Information for this report was obtained from a number of sources including the National Fire Protection Association (NFPA). In addition further information has been provided based on the work of members of the consulting team on various, similar projects.
2. Fire Dispatch Standards and Developments

2.1 Technology

The development and implementation of technology to support fire dispatching has increased rapidly in the past 20+ years. The principal developments include:

- Computer Aided Dispatch (CAD);
- Record Management Systems (RMS);
- Mobile Workstations (MWS);
- GIS/Mapping Systems;
- Global Positioning System (GPS) Unit Tracking;
- GPS Dispatch Recommendations;
- Interfaces with other services, principally with EMS services;
- Move up algorithms;
- Dispatch, Command and Tactical channels/talk groups; and
- Combined Events channels/talk groups.

Each of these has operated to increase the speed and accuracy of dispatch and the subsequent response to the scene by fire fighters. Some of the improvements have also improved interoperability with other fire departments as well with other service providers, in particular with EMS.

2.1.1 Computer Aided Dispatch (CAD)

Implementation of CAD systems was probably the single biggest game changer in fire dispatch. CAD systems serve to match a valid location for an emergency call with an incident type to instantly produce a recommendation to a dispatcher of the most appropriate units to respond. These systems can also provide premise-specific information such as pre-plans and hazard warnings as well as histories for all previous calls to the particular location.

The first fire CAD system in BC may have been the one implemented for Vancouver Fire in the spring of 1988. This was an early generation CAD and was a single jurisdiction system; it did not support mapping but it did support mobile data terminals (MDT) and was in continuous use until September 2001.

CAD systems have changed significantly and initially they were mainframe systems that were customized and relatively expensive. In the past 10 years the cost of CAD systems has plummeted at the same time they have become orders of magnitude more efficient. Modern CAD systems are usually Windows-based; have integrated mapping, and support interoperability with other emergency service providers. They almost without exception also provide other peripherals such as rip & run sheets for responders.

In many instances the CAD system will also have an interface to and from a fire Record Management System (RMS). In the first case this allows for all of the dispatch information...
collected including all times, units dispatched, comments from field personnel and others to be transferred to the RMS as part of the historical record to be completed by the fire department.

In the second case this allows for the CAD system to retrieve critical information pertaining to the incident location from the RMS while the dispatchable event is being created. This enhances responder safety by providing information related to the type of construction, the location of water, electrical and gas shutoffs, the presence of fire pre-plans etc. This two way relationship is illustrated in Figure 1.

Figure 1: Two-way Relationship between CAD and RMS

2.1.2 Record Management Systems (RMS)

The development and implementation of RMS lagged CAD by about 10 years. Early fire record management systems were not complex, often times containing very limited functionality with perhaps incidents, personnel and property information and most times this information was not linked to any other information or system.

Contemporary RMS systems have multiple modules including elements such as asset management, preventive maintenance, training, certification, inspections, rostering, station journals, pre-plans, etc. The significant feature of these record systems is that they are a ‘one-write’ system which means that the database contains all of the module elements. For this reason all records are linked which reduces effort and eliminates duplication and the inevitable data divergence found with standalone record systems.
2.1.3 Mobile Workstations (MWS)

Mobile workstations may once have seemed a frivolous addition to a fire department, but since their adoption they have become a basic requirement. The earliest workstations in fire apparatus were MDT’s (Mobile Data Terminals); they were ‘dumb’ terminals and any information displayed was transmitted to and from the MDT via a wireless link. For this reason, the amount of data displayed was very limited as the cost of wireless data coupled with the very slow transmission (baud) rates in those systems made it virtually impossible to transmit map or other data.

Current systems use mobile PC’s with large hard drives, connected to CAD systems via high speed commercial data networks at or near 3G speeds. This allows for a great deal of information to be transmitted to and from the mobile workstation including but not limited to mapping information, pre-plans, hazard warnings, etc. The mobile workstation units also support a dispatch ticket and map with recommended routing as well as digital status keeping which increases the ability to accurately record key time stamps, while at the same time reducing non-essential radio traffic.

2.1.4 GIS/Mapping Systems

The availability and implementation of mapping systems with CAD has allowed for a major increase in speed and accuracy, particularly with multi-jurisdictional dispatch centres such as Langford and Saanich. In these CAD systems, a valid location results in a near-instant map display centred on the caller’s location. This is especially useful for service providers covering large distances where every dispatcher may not be completely aware of every geographical feature. The mapping system includes the boundaries between dispatched and non-dispatched jurisdictions allowing dispatchers to make better decisions in terms of response.

Mapping integrated with CAD has also allowed in most cases for a much better location ‘hit’ for cell phones, and most recently with wireless Phase Two 9-1-1. Contemporary mapping tied to CAD also should allow for the input of x/y coordinates in the case of emergencies not on a standard road network, allowing responses to these incidents to be expedited.

2.1.5 Global Positioning System (GPS) Unit Tracking

The introduction of GPS unit tracking is yet a more recent innovation and has been introduced to fire CAD systems in BC within the past 5-7 years. For CAD systems without GPS tracking the dispatcher only knows what is termed the unit’s ‘last known location’. This may be the fire hall, or the location of an incident to which the unit has been assigned.

What is much more problematic is the unit’s location when moving either to or from a fire hall, an emergency incident, a drill ground, a fuelling station, the mechanical maintenance division or while on inspections. For all of these cases the dispatcher has no reasonably accurate way of knowing the unit’s location and when an emergency call is received the dispatcher must call multiple units by radio trying to determine which is the closest.
All of this takes time and increases the response time to the public. With CAD systems which have GPS, the dispatcher knows at a glance where the unit is located and can immediately dispatch them based on this information.

### 2.1.6 GPS Dispatch Recommendations

GPS dispatch recommendations are a further variation of the case above where the degree of automation is increased and the CAD system uses the GPS locations for multiple units to make best-case judgments to present the dispatcher with a complete recommendation of all of the closest units based on their real time locations.

Development of these systems is somewhat complex but when completed, results in the very quickest possible response of the right units to any emergency. What this also allows is for mutual aid units to be deployed across boundaries to ensure a timely and sufficient response to any particular call, increasing safety for the resident as well as the fire fighter.

The final iteration of this is expected in the near future and will provide GPS recommendations for fire and EMS units to be ‘weighted’ to ensure that the closest capable unit responds. This is likely to further improve service to the patient as well as eliminating needless responses by both services to calls that are a significant distance from their unit’s current location.

### 2.1.7 Interfaces with other services, principally with EMS services

Within the past 3 years it has been possible to develop and implement electronic interfaces between fire and EMS CAD systems. These interfaces have eliminated the former ‘latency’ between the times for dispatch of EMS and fire to medical/rescue events.

The interface operates to automatically create a call in the fire CAD system at the same time that the call is created in the EMS CAD. This completely eliminates delay in the response by the fire department to first medical responder (FMR) calls and also provides with a much higher degree of information regarding the call determinants from the EMS CAD. In addition the operation of the interface provides confirmation to the EMS dispatcher as to whether or not the fire/rescue agency will be responding.

These interfaces also allow for a further refinement in that the fire CAD which is receiving the incident from the EMS CAD can be configured to create, or not create a fire/FMR response. This is especially important for fire dispatch centres, whose dispatch clients may range from career, to composite to fully volunteer fire departments. Some of these fire departments may not wish to respond to the full range of FMR incidents, preferring to attend on an as-required basis. For each of these the EMS→Fire interface can be configured to provide only those notifications that the fire department wishes to respond to.

The previous ‘manual’ notification of fire by EMS made this more difficult as the fire dispatcher had to remember a large number of rules for each client department and with more than 1,000 MPDS codes this was a challenge and sometimes led to incorrect

---

1 Medical Priority Dispatch System.
responses. In most cases today's CAD systems are capable of managing these rules and only creating responses for those fire departments that wish to attend, reducing unnecessary or unwanted callouts.

These ‘rules’ for the management of response by fire/rescue departments are also configurable and changes can be made more easily than was once the case where such information was ‘hard coded’.

2.1.8 Move up algorithms

Most fire dispatch facilities are managing a larger number of calls than previously. This is because in many cases fire departments respond to an increased number of incident types and for a number of reasons, the overall call volume has increased.

In addition there is a trend toward consolidation of fire dispatch facilities with the result that a fire dispatcher may be managing multiple departments. Often these departments have agreed mutual aid or automatic aid agreements that allow for cross border responses.

For each of these examples one or more incidents may lead to a shortage of fire apparatus in any given area that requires correction by moving units from one area to another to balance the remaining available crews. The rules for these are complex and often change by the day of the week and the time of day. These are often referred to as ‘pattern changes’

For many years dispatchers were required to grasp a complex set of ‘analog’ rules for move-ups of apparatus based on these various criteria and sometimes the move-ups were slow to occur or occasionally neglected. This process has now been largely automated by the implementation of automated move-up algorithms.

These move-up systems have an interface to the CAD system and ‘listen’ to all the apparatus moves, and when pre-built triggers are reached, the system notifies the dispatcher with a pop-up message to the effect that they now have an unacceptable shortage of units in one area, and that one or more moves will resolve this.

These rules-based systems are becoming well established within contemporary dispatch systems and provide for a much more immediate relocation process to better manage risk. The rules that drive the move-up algorithms are developed by the fire departments to meet their local needs and they are regularly reviewed and can be adjusted as required.

2.1.9 Dispatch, Command and Tactical channels/talk groups

The availability of multiple channels or talk groups has allowed for a much more disciplined use of radio in support of the incident management system adopted by the North American fire service. This is reviewed in greater detail in a following section which discusses the external standard (NFPA 1561) that drives this operational model.

What is important is that the recognition of the need to separate dispatch, command and tactical radio occurred because of a number of fires with multiple-fire fighter deaths that were largely attributed to failures in the communications system.
As a result of these fires, in particular the fire in 1988 in Hackensack, New Jersey new emergency scene management models were developed that are very disciplined and segmented, all of which require multiple radio channels/talk groups. Many fire radio systems in BC have been upgraded to allow for this separation of voice radio at emergency scenes; the corollary is that dispatchers are now required to be fully familiar with the emergency scene management system utilized by their fire department. They must also assign, manage and monitor many more radio channels than was previously the case.

### 2.1.10 Combined Events channels/talk groups

The final major change in technology relates to the implementation of what are called combined events channels or talk groups. This is quite recent and was first piloted by the Richmond Fire/Rescue Department and BCAS in 2007/2008.

The combined events concept is that emergency responders from different classes of service—in this case fire and EMS—are provided with a common talk group at the time they are dispatched. As soon as they go on route, they switch to this channel, identify themselves and jointly manage their response to the incident.

The result is that neither service is surprised by the response of the other, and they can manage their arrival, entrance to the building and the quickest access to the patient. The combined talk group also reduces risk to the emergency responders by ensuring they have the most complete knowledge of the location of the other unit(s).

### 2.2 Standards

The standards of service for fire dispatch have been developed and have evolved in a series of documents provided by the National Fire Protection Association (NFPA). The NFPA describes its standards development process as non-political and requiring consensus for the approval process. The standards are regularly reviewed, usually on a 5 year cycle.

The CRD Request for Proposal identified 3 standards in particular; they are:

- Standard 1061: Professional Qualifications for Public Safety Telecommunicator
- Standard 1221: Installation, Maintenance, and Use of Emergency Services Communications Systems
- Standard 1561: Emergency Services Incident Management System

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2 The CREST radio system is fully capable of supporting the implementation of combined events talk groups for Fire, EMS and Police; for this to proceed there would be a requirement to define the common talk groups, confirm the dispatch policy for their assignment, develop operational guidelines followed by training and testing.

3 [www.nfpa.org](http://www.nfpa.org)
2.2.1 Standard 1061

Standard 1061 was issued December 1, 2006 with an effective date of December 20. This standard superseded the 2002 and the original 1996 standards and is specific to dispatchers and does not directly apply to 9-1-1 call management. The standard adopts the term ‘Telecommunicator’ to describe fire service call takers and dispatchers and defines them as:

An individual whose primary responsibility is to receive, process, or disseminate information of a public safety nature via telecommunication devices.\(^4\)

The Telecommunicator as noted is someone who receives, processes and disseminates information, often performing each of the tasks in a near simultaneous mode. A model for the call flow at such times is shown in Figure 2.

![Diagram](image)

**Figure 2: NFPA 1061 Communications Model**\(^5\)

The standard identifies three levels of Telecommunicator. The definitions of these are complex and progressive but for ease of understanding can generally be considered as the first being an entry level or call taker position, the second as a dispatcher with the third being a supervisor in a command post scenario. The Telecommunicator 2 is required to meet the


requirements for Telecommunicator 1 with additional defined duties. Likewise the Telecommunicator 3 is required to meet the accumulated duties of the first two as well as additional duties.

Each of the three positions is described with a separate section in the standard that identifies duties, required skills and knowledge and descriptions of the duties. At a minimum the personnel employed by Langford, Saanich and Victoria would need to function at the level of a Telecommunicator 2. The following generally describes their duties:

Telecommunicator (call taker) 1:

- Establish communications with the requester, using a communication device, a means of collecting information, operating procedures, and a work station, so that a communication link with the requester is achieved.
- Extract pertinent information, given a request for public safety service, so that accurate information regarding the request is obtained.
- Establish nonverbal communications, given a request for public safety service through a communications device, so that accurate information regarding the request is obtained.
- Prepare data for dispatch or referral by evaluating, categorizing, formatting, and documenting the incident per established policies, procedures, or protocols.
- Generate records of public safety services requests, given agency policies, procedures, guidelines, and resources, so that the record is correct, complete, and concise.
- Analyze information provided by a service requester, given the policies, procedures, and guidelines of the agency, so that the request is accurately categorized and prioritized.
- Assess incomplete, conflicting, or inconclusive information or data, given agency policies, procedures, guidelines, protocols, and resources, so that an allocation of resources is determined.
- Evaluate a categorized and prioritized service request, given available resources, so that an allocation of resources is determined.
- Initiate the timely addition, deletion, and correction of data, given agency policies, procedures, guidelines, and protocols, so that documents, files, databases, maps, and resource lists are accurately maintained.
- Convey instructions, information, and directions to the service requester, given agency policies, procedures, guidelines, and protocols, so that information appropriate to the incident is consistent with agency policies, procedures, guidelines, and protocols, and results in resolution, referral, or response.
- Relay information to other telecommunications personnel or entities, given processed data, so that accurate information regarding the request for service is provided.

Ibid, pages 6 and 7.
• Respond to requests for information, given an inquiry from the public or the media, so that the policies, procedures, and guidelines are followed.

Telecommunicator (dispatcher) 27:

• Monitor public safety radio systems, given equipment used by the agency, so that information requiring action by the telecommunicator is identified.
• Monitor electronic data systems, given equipment used by the agency, so that information requiring action by the telecommunicator is identified.
• Monitor alarm systems, given equipment used by the agency, so that information requiring action by the telecommunicator is identified.
• Evaluate incident information, given a validated request for service, available resources, and agency policies, procedures, guidelines, and protocols, so that an appropriate response is determined and a resource allocation prepared.
• Maintain location and status of units, given the resources available to the agency and utilizing the systems and equipment in the communications centre, so that the current availability, status, and safety of all deployable resources is known.
• Analyze alarm information, given signals, messages, codes, and data, so that the information is properly interpreted in preparation for the allocation of resources.
• Assess the priority of a service request, given information provided by other telecommunicators or field units and the agency policies, procedures, guidelines, and protocols, so that the priority of the request is defined.
• Formulate a response, using the validated and prioritized request for service and the availability of deployable resources, so that the most appropriate response is selected and the safety of response units is considered.
• Initiate deployment of response units, using the validated and prioritized request for service, given the agencies’ telecommunications equipment, so that service request information is conveyed to units designated for response.
• Activate the community emergency action plan, given data indicating the likelihood or onset of a critical situation beyond the normal scope of operations, so that the implementation is timely and in accordance with agency policies, procedures, guidelines, and protocols.
• Activate communication center emergency action plan, given internal emergency and agency policies, procedures, guidelines, and protocols, so that the integrity of the communications system is maintained and the safety of center personnel is achieved.

2.2.2 Standard 1221

Standard 1221 was most recently issued May 26, 2009 with an effective date of June 15, 2009 at which point it replaced the previous version. The history of the standard is interesting as it dates from 1898, and the 2010 standard is the 31st iteration. Over this period of time the

7 Ibid, page 7 and 8.
The standard has evolved and in the past number of years has begun to define call management standards in addition to specifications for electrical power, ventilation and supporting radio, CAD and other dispatch technologies.

The 1988 version of the standard was the last one issued prior to the introduction of call management objectives. To that point the standard only spoke of call volume and staffing in terms of a ratio. Specifically it noted at section 2-1.8:

- (b) For jurisdictions receiving 600 to 2,500 alarms per year, at least one operator shall be on duty in the Communication Center.
- (c) For jurisdictions receiving more than 2,500 to 10,000 alarms per year, at least two operators shall be on duty in the Communication Center.

The significant change occurred in the next edition of the standard, issued in 1994. This standard introduced the concept of performance objectives and notes the following at section 2-1.8:

> The number of operators shall be as follows:

- (a) For jurisdictions receiving 600 or more alarms per year, at least one operator shall be on duty in the communication center. The number of operators shall be sufficient to affect [sic] the prompt receipt and processing of and other request for fire department services as follows:
  
  (1) Ninety-five percent of alarms shall be answered within 30 seconds, and in no case shall the initial operator’s response to an alarm exceed 60 seconds.
  
  (2) The dispatch of the appropriate fire services shall be made within 60 seconds after the completed receipt of an emergency alarm.

The concepts in sections (1) and (2) have been retained in principle in all subsequent editions defining the time for fire dispatchers to answer the phone and complete the dispatch process.

The most recent standard as noted is dated as 2010 and has the following response time objectives in section 7.4:

> Ninety-five percent of alarms received on emergency lines shall be answered within 15 seconds, and 99 percent of alarms shall be answered within 40 seconds.

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8 The time frame for the management of 9-1-1 calls is separate and contained in a different section of the 1221 Standard.
Ninety percent of emergency alarm processing shall be completed within 60 seconds, and 99 percent of alarm processing shall be completed within 90 seconds.

As noted, the principle of answering and dispatching has been retained however the time frames have been shortened in the case of answering the phone call from 30 seconds to 15 seconds; dispatching is still at 60 seconds. These standards apply to all dispatched calls 95% of the time for call answering, and 90% of the time for actual dispatching. The performance percentage is to be calculated on a monthly basis.

The standards since 1988 have also added a defined response time objective for 9-1-1 call handling as follows:

*Where alarms are transferred from the primary public safety answering point (PSAP) to a secondary answering point, the transfer procedure shall not exceed 30 seconds for 95 percent of all alarms processed.*

These call handling standards are part of an overall response model that has been adopted by the fire service in North America. The objective is to parse all activities from the time a 9-1-1 call is placed until arrival of apparatus (the complete client response envelope) and can be displayed in Figure 3.

**Figure 3: NFPA Model for management of 9-1-1 and fire dispatch**
The first half of the model identifies 9-1-1 and dispatch; the second part of the model identifies turnout and travel time. The latter two are taken from NFPA standard 1710\(^9\) and the two standards are often viewed together in the sense of providing a total response objective.

The detailed call model from the 1221 standard is shown in Figure 4 and this illustrates four key processes:

1. The time to place a call to 9-1-1 and to have it successfully ‘down-streamed’ to the fire department (30 seconds);
2. The time to pick up, or answer the call reporting an emergency (15 seconds);
3. The time to interrogate the caller, determine the emergency, create a ‘dispatchable’ event in the CAD system and alert crews (60 seconds); and
4. The time for responders to ‘turnout’ from the fire hall and begin their response to the scene (60 seconds for EMS calls, 80 seconds for fires)\(^{10}\).

![Figure 4: NFPA Call Management Model](image)

In the diagram above, there are two timelines. The upper line describes the steps which occur from the moment at which the emergency event occurs, until the units respond to the incident. The lower line identifies the elapsed time at which these are expected to occur.

The overall process described above, with response time objectives can be described in the following manner.

- Emergency Event.
  - An emergency occurs (this can be either a fire or medical incident\(^{11}\)).

\(^9\) NFPA 1710 is the standard for the operation of a career fire department; NFPA 1720 is the standard for composite or volunteer fire departments. Each of these in their most recent editions propose a time frame for the arrival of fire units and the commencement of rescue and fire suppression.

\(^{10}\) This standard to turn out from the fire hall applies only to career units, i.e., ones that have their staffing complement ‘on duty’ at the time call is received.
• Until emergency services are notified in the following steps, this emergency has not yet been noticed or reported.

• Detection.
  • The emergency event has been ‘detected’ leading to notification of emergency services.

• Alarm Initiated.
  • At this point a call to an emergency service is placed by dialling 9-1-1, or another 10 digit number and is transferred to the PSAP\textsuperscript{12} by the Public Switched Telephone Network (PSTN).

• Transmission.
  • In this step the PSTN makes the routing decisions and ‘presents’ the emergency call to the 9-1-1 primary call agent(s) at the PSAP.
  • The time for this to occur is indeterminate, though it may be measured by the telephone company; to this point emergency services have yet to be notified of the emergency.

• Alarm Sounds at PSAP.
  • This is the point at which the emergency call first begins to ring at the 9-1-1 call centre.

• Alarm Transferred to CC.\textsuperscript{13}
  • The 9-1-1 agent at the PSAP queries the caller to determine which emergency service they require and then transfers them to the call taker for that class of service.

• Alarm Sounds at CC.
  • This is the point at which the emergency call first begins to ring at the communications centre.
  • This is normally the first point at which the communications centre has the ability to begin measuring the elapsed times for call management.

• Answered.

\textsuperscript{11} This model also applies to Police and EMS events however there are no specific defined call management metrics for these.

\textsuperscript{12} Public Safety Answering Point, another term for a 9-1-1 call centre.

\textsuperscript{13} Communications Centre.
• This is the time frame which measures the interval between when the emergency call first begins ringing, until the call taker has begun speaking with the caller reporting the emergency.
• The expectation is that all calls will be 'answered' within 15 second 95% of the time; and within 40 seconds 99% of the time.
• This measurement equates to the time taken until the phone is 'picked up' by the fire call taker.

• Notification of TC.\textsuperscript{14}
  • This is the point at which the call taker begins taking information from the caller reporting the emergency and this period of time ends when the dispatcher has completed the dispatching process.
  • The expectation is that all calls will be processed to the point at which the call has been dispatched, within 60 seconds 90% of the time and within 90 seconds 99% of the time.
  • This measurement equates to the total time taken until fire crews have been alerted and the information transferred to them.

• Alarms Retransmitted to ERF's\textsuperscript{15} and Response Units.
  • This marks the completion of the dispatch process and the commencement of the ‘turnout phase’ for the fire service. This is the interval between when dispatching has been completed and when the Fire/EMS service leaves the fire hall.
  • The expectation is that turnout from the fire hall will occur within 60 seconds for EMS calls and within 80 seconds for fire calls.\textsuperscript{16}

• Response Units Respond
  • This marks the completion of the turnout phase, and the commencement of the travel time which is completed when the unit(s) arrive at scene.

In summary, the expectation is that all emergency calls for service will be answered, the caller will be interrogated, the ‘call’ will be created on paper or in a computer aided dispatch system,

\textsuperscript{14} In this document TC stands for Telecommunicator; in this context it equates to the fire call taker/dispatcher employed by Langford, Saanich or Victoria.

\textsuperscript{15} Emergency Response Facility, in this case a Fire Hall.

\textsuperscript{16} The timeframe for turnout is described in an associated NFPA Standard 1710 which describes the operation of a Career Fire Department.
and the tones and information will be sent to the responding fire fighters within 60 seconds, 90% of the time.

The time for this measurement begins when the phone first starts to ring in the fire dispatch office, and lasts until the response information has been gathered and transferred to the emergency responders. Where an agency uses a CAD system these times are normally recorded as time stamps and thus can provide the basis for analysis.

The reason for the focus on the time required to create a call and dispatch it, is well founded in the notion that emergency calls being reported to the Fire and EMS services are serious when they occur and have the capacity to significantly deteriorate in a very short space of time. This in turn requires that the initial phases—9-1-1 call taking, call assessment and dispatch—occur in the shortest possible time to insure the earliest possible intervention by emergency services personnel.

A primary mandate of any fire department is to provide for a timely response to fire and medical emergencies, as well as hazardous materials, technical rescue and other public safety interventions. In the vast majority of these, crews respond from a fire hall and travel some distance to the incident. Because these responses must occur within a relatively short time frame to minimize fire damage and save lives, effective call management is crucial. This is because emergency call management is the precursor or ‘gating’ item for Fire and EMS response to the scene.

The NFPA has developed response time objectives for the North American fire service over many years and these provide applicable benchmarks. The NFPA standards are international peer-reviewed standards that address most if not all issues related to the operation of the fire service. NFPA 1710\textsuperscript{17} is the standard that describes the organization and management of a career fire department and defines response time objectives for the turnout of crews from the fire hall, as well as 4 minute and 8 minute expectations for arrival at any emergency incident.

The graph shown in the following figure is taken from the NFPA 1710 standard and demonstrates the expected fire propagation curve, which indicates the point at which a fire is expected to spread beyond the room of origin. This is normally at or about 8 minutes from the point of ignition.

From this graph it can be seen that in the range of time from 7 to 9 minutes after ignition, a fire is expected to rapidly accelerate and the percentage of property destruction (shown on the Y axis) increases from approximately 30% to a little less than 70%. At some point in this short period of time, the assumption is that the fire will spread beyond the room of origin.

The significant point is that each of the steps in the fire department’s response sequence, including 9-1-1 call processing, call assessment, dispatch, turnout and travel time, should all occur prior to the time when a fire will extend beyond the room of origin, thereby creating a much higher risk to life and property. In this regard, the NFPA notes:

*In Figure A.5.2.2.2.1, [Figure 4 above] the line represents a rate of fire propagation in an unsprinklered room, which combines temperature rise and time. It roughly corresponds to the percentage of property destruction. At approximately 10 minutes into the fire sequence, the hypothetical room of origin flashes over. Extension outside the room begins at this point.*

Consequently, given that the progression of a structure fire to the point of flashover (i.e., the very rapid spreading of the fire due to superheating of room contents and other combustibles) generally occurs in less than 10 minutes, two of the most important elements in limiting fire spread are the quick arrival of
sufficient numbers of personnel and equipment to attack and extinguish the fire as close to the point of its origin as possible.\textsuperscript{18}

The key element going forward is the requirement to manage all parts of the response equation as quickly as possible.

As part of the requirement to perform the work as quickly and accurately as possible, the 1221 standard also addresses the call handling model and notes that one of two styles of operation is possible, the vertical or the horizontal model.

\begin{enumerate}
\item \textbf{Vertical Center.} A single telecommunicator performs both the call-taking and dispatching functions.
\item \textbf{Horizontal Center.} Different telecommunicators perform the call-taking and dispatching functions.
\end{enumerate}

Telecommunicators working in a vertical center are known to engage in multitasking that can inhibit their ability to perform assigned job functions.\textsuperscript{19}

This initiative to separate call taking from dispatching relates in part at least to the requirement for dispatch personnel to remain very focused on the emergency scene. [this is noted in more detail in the section following on NFPA Standard 1561] The requirement to focus on the emergency scene is noted in section A.7.3.3. as follows:

\begin{quote}
The issue of communication capabilities and/or failures is cited by the National Institute for Occupational Safety and Health (NIOSH) as one of the top five reasons for fire fighter fatalities. The importance of an assigned telecommunicator for specific incidents is a critical factor in incident scene safety. The assignment process should be outlined in specific SOPs within each agency represented in the communications center. This assignment process is further assisted when a command/ communications vehicle is being staffed at the incident scene.\textsuperscript{20}
\end{quote}

Emphasis added

\subsection*{2.2.3 Standard 1561}

Standard 1561 was issued December 11, 2007 with an effective date of December 31. This standard was first issued in 1990 and was a companion document to NFPA 1500 which

\begin{itemize}
\item \textsuperscript{18} NFPA 1710, 2010 edition, A.5.2.2.2.1.
\item \textsuperscript{19} NFPA 1221—2010, page 30.
\item \textsuperscript{20} Ibid, page 31.
\end{itemize}
defines the occupational health and safety program for fire departments. This initial standard was superseded by revisions in 1995, 2000, 2002 and 2005. The 2008 edition is described as a complete revision as follows:

The 2008 edition is a complete revision that provides additional emphasis in areas of incident management to improve the safety, health, and survival of responders. Language and terminology in the document have been revised to ensure that users of the document are in compliance with NIMS\textsuperscript{21}. Definitions have also been revised for standardization between the health and safety standards the committee is responsible for.

Material throughout the document has been reorganized to present the material in a manner that makes the standard easier to use and to recognize an incident management system as an organizational tool that should be compliant with national standards and directives.

New requirements for a system qualification process and a requirement for communication capability with responders when they are working in an Immediately Dangerous to Life and Health area have been added. Substantial annex material has also been added, including two new annexes. One provides information on emergency operations centers, and the other provides information on area command, including organization charts to illustrate both a unified command organizational structure and an area command organizational structure\textsuperscript{22}.

The revisions to the standard reflect the change in emphasis over time and a strong understanding regarding the ways in which communications systems and personnel are inextricably linked to fire fighter safety.

One of the areas described in NFPA 1561 is the use of radio channels or talk groups for dispatch, response and emergency scene management. The analysis defines three types or groupings as Command, Dispatch and Tactical\textsuperscript{23}.

- **Command Radio Channel.** A radio channel designated by the emergency services organization that is provided for communications between the incident commander and the division/group supervisors or branch directors during an emergency incident.

\textsuperscript{21} National Incident Management System, as defined by the Federal Emergency Management Agency (FEMA).

\textsuperscript{22} NFPA 1561, 2008 edition, page 1.

\textsuperscript{23} As noted earlier, the CREST radio system is capable of providing this configuration of radio talks groups.
• **Dispatch Radio Channel.** A radio channel designated by the emergency services organization that is provided for communications between the communication centre and the incident commander or single resource.

• **Tactical Radio Channel.** A radio channel designated by the emergency services organization that is provided for communications between resources assigned to an incident and the incident commander.\(^{24}\)

This configuration allows for orderly radio management to support all phases of the response and can be shown in the following diagram taken from a system with up to 16 talk groups.

![Diagram of radio channel groups as per NFPA 1561](image)

**Figure 5: Radio Channel Groups as per NFPA 1561**

The linkage with the dispatch function is noted at section 6, specifically:

\textit{6.4.1 The incident management system shall provide SOPs\(^{25}\) for a telecommunicator to provide support to emergency incident operations.}

\(^{24}\) Ibid, page 6.

\(^{25}\) Standard Operating Procedure.
6.4.2 Telecommunicators shall be trained to function effectively within the incident management system and shall meet the qualifications required by NFPA 1061, Standard for Professional Qualifications for Public Safety Telecommunicator.

6.4.3 The incident commander shall be provided with reports of elapsed time-on-scene at emergency incidents in 10-minute intervals from the ESO communications center, until reports are terminated by the incident commander.26

The standard is more than 50 pages in length and describes emergency incident management in great detail; one key point is the degree to which the standard relies for its effectives on communications systems and models as well as for Telecommunicators to be fully trained and conversant with it.

2.3 Implications for Fire Dispatch in the CRD

The presence of recognized standards of service provides the Fire Departments in the CRD with a basis to quantify the service provided in dispatch contracts as well as to revise agreements based on changes to technology and dispatch practice.

The renewal of any contract for fire dispatch service should provide an opportunity for a more detailed review of the applicable NFPA standards (1061, 1221 and 1561) to ensure all parties to the agreements have full clarity as to their meaning. The reasons for this relate to the breadth of the scope of the standards and unless there is a specification to the contrary it might be argued that the entire standard as written should apply. This would include all of the language related to job performance, training and certification, the need for full system redundancy, quality assurance programs, etc.

Full compliance with the NFPA Standards may require additional capital and operating costs that should be well understood prior to a commitment to achieve this. It may be that on further review that there will be agreement that some parts of the standards should be achieved immediately; others to be achieved over a period of time that is agreeable to all participants. In the alternative it may be agreed that some sections of the standard might not apply.

Regardless, if there is to be a reference to the standard in the contract for the provision of fire dispatch, then an appropriate reporting process should be defined as well as remedies should, for example, the proposed standards of service not be achieved. It is recommended as well that the provision of service level agreements should also be considered.

The second implication with reference to the standard of service is that it is subject to revision from time to time. For this reason the CRD should consider participating more fully with the NFPA, certainly to the point of reviewing the most recent standard and participating with the ongoing review process including the development of tentative interim amendments.

Participation at this level would be appropriate for the CRD in the same way that it currently participates with the BC 9-1-1 User’s Group. Such participation would ensure that the CRD was aware of ongoing developments with regard to the provision of fire dispatch thereby assuring that its agreement with the dispatch service provider was current and anticipated the changes that are a regular part of the review cycle.
3. **Funding**

Funding for fire dispatch can be derived in a number of ways that include the development of cost allocation models based on agreed cost drivers, the value of property assessments, or on historical agreements. There are examples of each of these in the context of British Columbia.

### 3.1 Cost Allocation Models

Cost allocation models based on agreed cost drivers are probably the newest form of agreement, and they flow from the desire to fully evaluate the cost for service. Cost allocation models are the basis for a number of types of agreements that include the provision of dispatch but also such things as radio systems, shared record management systems and others.

The basis for cost allocation models is the notion that there is a cost to provide the particular service and that the cost for this can be quantified and used as the basis for calculation of service. In dispatch models the most basic model has a single cost driver, which is usually call volume. This is based on the assumption that the fundamental costs to provide a dispatch service are dispatch salaries and a technology such as CAD that is sized appropriately.

In this model as an example, there is agreement that an agency that has 50% of the call volume is reasonably assumed to require 50% of the time and energy of the dispatch system, and thus is required to pay that percentage of the overall cost. Such cost allocation models often further define this model to divide the cost of the provision of service into two parts. The first of these describes the basic, or core costs for the system for all dispatch clients; the second describes any connectivity or technology that is required only for a particular dispatch client but not all.

The formula for the calculation of dispatch costs then equals the following:

\[
\text{Agency Cost for Dispatch} = \sum C_1 + C_2
\]

Where \( C_1 \) = the proportional share of the core system costs including salaries\(^{27}\); and \( C_2 \) = agency specific costs for connectivity and features which are unique to that agency.

### 3.2 Property Assessments

In other jurisdictions the costs for dispatch are based on the value of property assessments with areas paying a share of the total cost of the dispatch system that is based on

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\(^{27}\) The core costs would normally also include a cost for management overhead.
assessments. This model is found in some areas in British Columbia and while it does allocate the entire cost of the operation between the dispatch clients it may be based on risk rather than actual usage. For this reason it may not provide for an equitable allocation of the costs to provide the service.

3.3 Historical Agreements

The third cost model is one based on historical agreements for which there is no particular basis. These agreements were often based on an order-of-magnitude assessment of costs at some particular time and which has simply been continued. These types of agreements may once have been the norm, but may no longer provide equity in terms of the cost of providing the system.

3.4 Summary

There is range of models for calculating the costs of providing dispatch services. Of these, the system which is likely to provide the greatest degree of equity is a cost allocation model that is based on an agreed view of the cost of providing the service, allocated on the basis of one or two cost drivers.

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28 One example of such a cost model the Regional District of Okanagan Similkameen.
4. Governance

Governance is a very widely used term with a number of context-specific interpretations. It usually refers to the structure, responsibilities, policies, and internal controls by which an organization is directed and managed. It is essentially a mechanism to provide accountability for the way an organization manages itself.

4.1 Governance Fundamentals

The governance structure in public safety support organizations (e.g., 9-1-1 systems or fire dispatch) must provide overall oversight of management and operations. All key stakeholders must be represented. Financial contributions from the stakeholders may affect the structure however ownership of the subject service and/or system assets may be entirely separate from governance. There are a number of models in Canada for a governance model that includes multiple levels of government. These include E-Comm in the Metro Vancouver area as well as the inter-regional cooperative model for the provision of a hosted 9-1-1 and fire dispatch service in the Regional District of Fraser Fort George.

The governance structure must consider and incorporate:

- Clearly defined responsibilities;
- Effective decision-making processes;
- An adequate legal structure;
- Appropriate stakeholder input and influence;
- Effective working relationships;
- Neutrality with respect to stakeholders; and
- Governing Provincial Acts and regulations.

Within the governance structure the functions of oversight and management should be clearly separated. The senior governance body (e.g., Board of Directors) typically decides on:

- Changes to management / operational structure;
- Selection of CEO and senior Management;
- Changes to cost sharing arrangements;
- Approval of annual budgets;
- Management salary scales; and
- Issues that cannot be resolved by Management.

The executive and management organization reports to the senior governance body and deals with:

- Operational issues with user groups and suppliers;
- Service quality (to users and from suppliers);
• Strategic and tactical planning;
• Initiating system additions and changes;
• Administration;
• Preparation of annual budgets;
• Human resources and labour relations issues; and
• Training, disaster recovery plans, etc.

Other required aspects of governance include (i) demonstrated accountability with regular audits, (ii) transparency and disclosure such as publicly available reports and (iii) legal liability. These aspects are covered to a large extent by federal and provincial laws.

4.2 Issues and Risks

There are a number of key governance issues that must be addressed when establishing a governance structure. These include selection of members of the senior governing body (e.g., Board of Directors), stakeholder representation and voting and participation of directors in shareholders meetings, if applicable. Board members must understand their rights and responsibilities and should always put collective needs first. Some independent members (i.e. neutral experts) should be included. Voting rules should strike a balance between (a) equal share / equal vote (favours small members) and (b) votes based on financial contributions (favours large members). Voting procedures may be different for different types of decisions (e.g. financial vs. operational).

The following are examples of governance problems that can be avoided if the governance structure is well designed:

• No method to proceed without unanimous agreement;
• Uncertain quorum levels;
• No method to deal with deadlock situations;
• No method to deal with financial shortfalls;
• No process for adding stakeholders (e.g., new Emergency Response Agencies);
• Out-dated governing documents;
• Insufficient management / operational staff to implement board decisions;
• Excessive political influence;
• Board decisions overruled at shareholder meetings; and
• Board decisions on technical and user issues without proper understanding.

4.3 Governance Options

A governance structure may be built around the following entities however available options may be restricted by Government statutes or other agreements:

• Direct service delivery
• Government Department / Agency;
• Crown Corporation;
• Member-owned, non-profit Corporation (several variations);
• Joint Venture;
• Society;
• Public Authority; and
• Public/Private Partnership.

The governance and management structure for a 9-1-1 PSAP or consolidated fire dispatch provider must include a manager with trained call answer / dispatch staff and administrative support. Typically this manager is a key member (perhaps ex officio) of a Management Committee consisting of involved stakeholder representatives which meets to review and resolve issues on a regular basis.

The Management Committee should be created by and operated under the oversight of local government. This Board typically approves budgets, develops and approves the strategic plan, makes key directional decisions and resolves any issues that may be escalated to it by the Management Committee.

4.4 Implications for the Fire Dispatch Contracts

At the present time, in the CRD, fire dispatch service for number of areas is contracted. A fire dispatch contract should outline the requirements for the operation and maintenance of the service and may include an Operations Management Committee (The Committee) that defines the mandate of the Committee including its:

• Authority;
• Membership;
• Procedure;
• Cost; and
• Committee Chair.

The governing body may wish to ensure that its governance model as defined in the contract ensures that it has oversight for each relevant issue. These would include the responsibility for the production of all call handling reports required to confirm that the NFPA 1221 Standards are being met.

Governance language could also be required to confirm the ownership of the dispatch process and a method by which changes to the agreement could be proposed and adopted as well as the implementation and regular review of service level agreements.
5. Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CAD</td>
<td>Computer Aided Dispatch</td>
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<tr>
<td>E9-1-1</td>
<td>Enhanced 9-1-1</td>
</tr>
<tr>
<td>EMS</td>
<td>Emergency Medical Service</td>
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<tr>
<td>FMR</td>
<td>First Medical Responder</td>
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<tr>
<td>GIS</td>
<td>Geographic Information System</td>
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<tr>
<td>GPS</td>
<td>Global Positioning System</td>
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<tr>
<td>MDT</td>
<td>Mobile Data Terminal</td>
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<tr>
<td>MWS</td>
<td>Mobile Workstation</td>
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<tr>
<td>NFPA</td>
<td>National Fire Protection Association</td>
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<tr>
<td>NG9-1-1</td>
<td>Next Generation 9-1-1</td>
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<tr>
<td>PSAP</td>
<td>Public Safety Answering Point</td>
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<tr>
<td>PSN/PSTN</td>
<td>Public Switched Network/Public Switched Telephone Network</td>
</tr>
<tr>
<td>SSAP</td>
<td>Secondary Safety Answering Point</td>
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</table>
Summary: 1) The purpose of this technical memorandum is to describe several fire communications centres operated by other Canadian jurisdictions and compare these to current CRD fire dispatch facilities and operations. Results of this benchmarking process will be considered in developing options for CRD.

2) The performance benchmark is published by the NFPA and relates to the ability to receive and process emergency calls within a stipulated timeframe; specifically within 60 seconds 90% of the time. This is discussed in greater detail in TM02B, and it should be noted that defined performance standards are relatively recent, and have recently been relaxed.

3) Performance to the NFPA 1221 standard is mentioned in a number of contracts for fire dispatch both within the CRD and in other jurisdictions. A number of these service providers are now implementing procedures and reporting so as to measure their success and where it is non-compliant taking further steps to address this.

4) Based on our review of the benchmark fire dispatch providers referenced, few if any at the time they were reviewed are meeting the NFPA 1221 standards though as noted they are taking steps to address any shortfalls. The performance of the CRD fire dispatch centres while also not meeting the standard is improving and is at the level of the other centres that have been reviewed.

5) Critical technologies that are found in other benchmark fire dispatch providers such as Mobile Workstations, integrated Record Management Systems, move-up software and an interface with the ambulance service are either in place or are being implemented. In each case the CAD systems used in the CRD are capable of full compliance with all required functionality.

6) The physical security of the dispatch centres for the protection of personnel and operating equipment is a requirement of the NFPA 1221 Standard and is a concern in at least one of the dispatch centres in the CRD. The issue of security is being addressed or has already been addressed by the majority the benchmark group.
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1. Introduction

1.1 Background

This is one of six technical memos being prepared for the CRD during the first stage of a review of 9-1-1 services and fire dispatch in the Capital Region. The other technical memos describe the current 9-1-1 and fire dispatch situation in the CRD as well as external industry standards and developments. A final report will contain options for the CRD based on this work. There are separate technical memos for 9-1-1 and fire dispatch.

1.2 Purpose of this Report

The objective of this report is to describe several Canadian benchmark emergency communications centres and supporting organizations and compare these to current CRD 9-1-1 and fire dispatch facilities and operations.

1.3 Methodology

Information for this report was obtained from site visits, meetings, telephone conversations, and e-mail exchanges with managers of the benchmark communications centres as well as public information and internal documents provided by those interviewed. Information was also provided based on work by the consultants for these and similar agencies.

1.4 Performance Criteria

Fire dispatching is a time-critical process that has a mission to dispatch the correct apparatus to an emergency location, as quickly and accurately as possible. The basis for the performance criteria—the prompt arrival of fire crews—is provided by the National Fire Protection Association (NFPA). Specifically these response standards are found in two operational standards:

- NFPA 1710 (career fire departments); and
- NFPA 1720 (volunteer fire departments).

The performance objectives for fire dispatch are found in NFPA 1221 and apply equally to career and volunteer fire departments. A more complete discussion of the dispatch performance standards is developed in technical memo 2 (fire dispatch).

Technical memo 2 describes the development of performance standards and the recent changes which became effective in 2009. A summary of these developments is shown in Figure 1 which illustrates first of all the changes in the standard over time and second the
degree to which performance criteria that apply today have only very recently been identified and proclaimed\(^1\).

\[\text{Figure 1: NFPA 1221 Evolution of Performance Standards}\]

From this illustration it can be seen that the requirement to demonstrate a percentage completion for the dispatch process was first developed in 2002 with a revision, and a lowering of the performance standard in the revision for 2010.

This is noted because the recognition and adoption of the performance standard by fire dispatch providers is quite recent and their ability to measure dispatch performance over a reasonable period of time is limited by their awareness of the standard in addition to the accumulation of a reasonable amount of dispatch data.

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\(^1\) This refers to the requirement to complete the dispatch process within 60 seconds, 90% of the time; this change became effective in June 2009.
2. Fire Dispatch Benchmarks

2.1 Overview

The CRD/GVFCA RFP proposed a review of fire dispatch in the region as compared to the NFPA 1221 Standard. This standard of service is relatively new, with measurable performance standards only being introduced within the past 8 years.

These standards have been modified over time so that dispatch at one time was to be completed in 60 seconds, without reference to a percentage of completion. It was not until 2002 until a success rate for the completion of the dispatch process was set at 95%; this threshold proved difficult to achieve and accordingly it was modified to 90% in the 2010 edition of the standard. The notion of quality assurance was not mentioned in the standard prior to 1999 and did not include quality improvement until 2007.

Because the performance standard is quite new and because it has changed a number of times over a relatively short period of time, demonstrated compliance with the standard by fire dispatch providers has been uneven as might be expected.

A number of fire dispatch providers including the CRD have provided some language in their contracts with regard to meeting the NFPA 1221 but most often this has been done without reference to the particular level of service or the year of the standard that would apply. This needs to be better clarified within any contract, as without qualifying wording such language could be read as committing the parties to meeting all of the requirements of the standard without exception.

The benchmark fire dispatch providers that are used in this review include ones that the consulting group has direct experience with and include:

- Regional District of Central Okanagan/Kelowna Fire Department
- Regional District of Fraser-Fort George/Prince George Fire Department
- E-Comm, Emergency Communications for Southwest BC
- Coquitlam Fire Department
- Lethbridge Fire/EMS Department
- Toronto Fire Service

In each case the consulting group has worked with the above noted service providers reviewing their performance data within the past 24-36 months. These reviews have led to recommendations to address performance issues and measures to introduce regular reporting, service level agreements and quality assurance initiatives.

There is a more detailed discussion with regard to the technical facilities in TM01B which describes the situation analysis and a review of performance standards which is found in TM02B.
2.2 Technology

In each of the benchmark departments CAD is provided and is either an Intergraph or FDM CAD system. In these departments, the CAD includes mapping and in most but not all of them mobile workstations are deployed. In terms of the CAD vendors the distribution of CAD and RMS follows:

- FDM CAD
  - Regional District of Central Okanagan, with FDM RMS
  - Regional District of Fraser-Fort George, with FDM RMS
  - Lethbridge, with FDM RMS

- Intergraph CAD
  - E-Comm, with FDM RMS/Project FIRES
  - Coquitlam, with FDM RMS/Project FIRES
  - Toronto, with Sunpro RMS

Two departments (E-Comm and Coquitlam) have recently deployed an IP based fire hall alerting system to speed up the dispatch process and Lethbridge has contracted for this, to be implemented in 2011 as part of their transition from FDM to Intergraph CAD.

Each of the two CAD vendors supports mobile workstations, rip & run data sheets, an interface from BCAS, an interface with radio including fire hall alerting, resource allocation software and is Phase 2 wireless compliant.

2.3 Performance Standards

Measurement of dispatch performance against the NFPA standards is fairly recent as noted. Most fire departments in the benchmark group have recently conducted reviews of their dispatch times, and without exception have been shown to be non-compliant with the 60 seconds to dispatch, 90% of the time when measured on a monthly basis.

For a number of reasons these agencies have not chosen to release their performance metrics publicly and in most cases are implementing measures to improve performance. In particular the Toronto Fire Service has recently completed an extensive quality assurance review and is well underway with major changes to their technology including an upgrade and a change in workflow as well as the implementation of a quality assurance/improvement program.

Without discussing the details of the dispatch performance of these other departments it is fair to say that the CRD fire departments are within the range of the benchmark departments and that none of the benchmark departments was fully compliant with the NFPA standard when they were first examined. A more complete analysis of dispatch performance is contained in technical memo 01B.

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2 The Lethbridge Fire/EMS Department has commenced a transition from FDM CAD to Intergraph CAD which is expected to be completed by May 2011.
2.4 Quality Assurance

Quality assurance programs were first mandated in the NFPA 1221 Standard in 1999 at which time they were described as follows:

*It is the intent of this standard to establish the required levels of performance and quality of installations. However, it is not the intent of this standard to establish the methods by which these requirements are to be achieved.*

By 2002 the language describing the quality assurance process was more focused:

*Communications centers shall establish a quality assurance program to ensure the consistency and effectiveness of alarm processing.* [emphasis added]

As mentioned the Toronto Fire Service is implementing a quality assurance program while most others have just become aware of the process. In British Columbia, the Kelowna Fire Department has made major strides in the past 1+ years with a quality assurance initiative that has demonstrated remarkable success with improving dispatch handling times. Other fire dispatch centres have recently committed in principle to implementing quality assurance programs but few if any have formally adopted such programs to date.

2.5 Cost Models

The cost models used for the provision of dispatch service have a considerable range and this is evident in recent procurement processes. In some cases, the range of proposed costs for the same service (from different providers) can exceed 100% and there is often a lack of a complete rationale for how the total cost is derived.

A number of service providers however have begun developing cost allocation models that identify known cost drivers and use these as a basis for dispatch services. One such example is E-Comm which bases its costs on a combination of call volume and the number of fire halls with the ratio of these dependent on whether or not the fire halls are career or volunteer.

The rationale supporting this approach is based on the total cost to provide the service with call volume being considered as a reasonable estimate of dispatcher’s time which in turn drives salaries and system sizing. In addition, the number of fire halls is used to provide an estimate of the cost of the CAD system and supporting technologies. In some cases the cost model assigns a 50% weighting to each of these costs drivers; in other cases the percentage is weighted more heavily on call volume.

The emergence of cost allocation models as the basis for the provision of dispatch service is a reasonable alternative for all future contracts within the CRD and would provide a clear level of understanding of the value received for the price paid.

Within the benchmark group, in most cases the dispatch provider is a fee-for-service provider for a basic level of service offered to all dispatch clients. In other cases, there is a demand for a variance from the standard model which is being accommodated. The challenge with this
approach is how to correctly allocate the cost for what might be a premium level of service; also whether offering this differential level of service increases risk.

An issue related to cost models, is the governance or management for contract dispatch providers. Over time however this has been changing to where there is a more robust relationship between the dispatch provider and its clients with the implementation of user groups.

### 2.6 User Groups

The development of user groups to provide a forum for dispatch clients is not universally consistent within the benchmark group. Some including E-Comm have defined user groups that provide feedback to the service provider on all matters related to dispatch management.

These user groups provide a regular avenue for the dissemination of new information including changes to the technology as well as policies and procedures for the dispatch process. As well, they allow for input from the dispatch clients to identify issues that may or may not be a problem but which may need some investigation. In the case of the benchmark departments that have dispatch clients, they either have, or are planning to engage more fully with the departments they provide service for.

One example of an area of feedback identified by some of the CRD dispatch clients was with regard to potential changes in the 9-1-1 triage model to ensure notification of the fire departments in a timelier manner with regard to calls such as motor vehicles accidents and others. Anecdotal information was provided regarding perceived delays in such calls that resulted in the fire department arriving much later than should have been the case.

### 2.7 Standard Features

The standard features found in the benchmark departments include CAD, Record Management Systems, mobile workstations, rip & run sheets, interfaces from ambulance providers, mapping, integration with radio and paging systems, voice logging systems, call check records and fire hall alerting systems.

For the most part the fire departments in the CRD have achieved the majority of these technologies with the exception of mobile workstations in all cases as well as mapping in the case of Victoria and the interface from BCAS in the case of Victoria and Langford as of the date this technical memo was prepared.

### 2.8 Emerging Issues

There are a number of emerging technological issues that are present in a majority of the benchmark departments. These include automated fire hall alerting systems such as at E-Comm and Coquitlam and shortly to be implemented in Lethbridge and under consideration by Kelowna.
Automated Alerting Systems

These automated alerting systems are IP-based and alert all fire halls simultaneously with the required tones and lights, and provide a measured readout of the alarm information using a pre-recorded voice. Because these systems operate in parallel they are much quicker to alert fire crews than the legacy tone paging systems which are invariably sequential in nature. Also because they use a recorded human voice they are totally consistent in volume, cadence and timbre.

Move-up Algorithms

A second issue is the use of move-up algorithms to provide timely advice to dispatchers with regard to areas of their dispatch district which are short of equipment and crews. There are a number of vendors for these systems including Deccan which has been implemented and used for some time by the Surrey Fire Department.

Other dispatch providers are considering the implementation of move-up software including Toronto and E-Comm and it is a product worth mentioning though it only works in an optimum way where there are fire departments with multiple fire halls, or where a group of fire departments are operating under an automatic mutual aid model. It would not be recommended for fire departments with just one or two fire halls.

Hosted CAD and RMS

An additional emerging issue is the use of hosted systems to allow for the implementation of complex and expensive technology at a lower initial and ongoing cost. Examples of this include E-Comm which offers its CAD and RMS to other departments using an Application Service Provider (ASP) model. In this model the software applications are served from the host in Metro Vancouver to clients such as Saanich, as well as Coquitlam Fire Departments which have chosen to retain their dispatch facility but wished to participate with a standard implementation of the core software. Other examples of hosted systems supporting multiple dispatch centres include the RCMP and BC Ambulance.

One option for the fire departments in the CRD is to deploy its fire RMS on a hosted basis with links to the dispatch CAD system for its fire departments to increase their operational efficiency. Such a deployment using a shared services model would allow for true benchmark comparisons between fire departments at a lower cost than implementation of standalone systems.

The benefit to the participating agencies is that they gain the use of a standard system without undertaking all of the procurement, work-flow design, training and ongoing maintenance that is required with a standalone system. In most cases as well this has been shown to be more cost-effective.

Physical Security

The issue of the physical security of the dispatch centre for the protection of personnel and equipment has also received greater attention, in part at least driven by a heightened
awareness as well as by changes in the NFPA standard. Within the CRD, the most physically secure dispatch would be Saanich, followed by Langford and then Victoria. Of these the greatest concern would be for the facility in Victoria, which is noted in TM01. Most centres observed in previous work by our team have secure facilities when considered against the 1221 Standard and these include Lethbridge, E-Comm, and Toronto. Coquitlam’s new dispatch centre is about to open and it will have the same high security with proximity card access as the first three.
3. Conclusions and Implications for the CRD

The following conclusions can be drawn from the benchmarking information described in the previous sections.

3.1 Overview

The three fire dispatch communications centres in the CRD serve a significantly smaller population per centre than most of the benchmark organizations. As a result, consolidation to fewer centres should be seriously considered. This has the potential to reduce both total staffing and network connectivity costs but would require some level of capital expenditure and likely more complex arrangements between the stakeholders including significant change management issues.

3.2 Governance and Funding

A number of the benchmark centres utilize clear centralized governance and reporting structure. The governing body provides guidance, resolves issues and receives regular performance reports. In comparison, overall governance of 9-1-1 and fire dispatch services in the CRD is informal and fragmented.

There is a relative lack of formal agreements between all parties covering their responsibilities and no mechanism to provide performance monitoring and to take immediate action on a regional basis. The implementation of user committees would provide for valuable feedback on policy and technology and address a number of issues that arose during the survey of the fire dispatch clients.

3.3 Operations

Current evacuation and back-up facilities and procedures for the fire dispatch centres in the CRD matches that found in the benchmark departments. These range from operations such as Toronto, Lethbridge and E-Comm that have redundant backup sites that are regularly exercised to others which exist in theory but not in practice.

The development and regular testing of a backup facility with sufficient technology to manage all dispatch functions is a requirement of the NFPA 1221 Standard and should be a high priority for the fire dispatch facilities in the CRD.

3.4 Facilities and Telecommunications

The buildings, power supplies, and CAD systems used in the CRD are generally comparable to the benchmark centres. The Victoria Fire dispatch centre is one exception and a full review of this facility is recommended.

The CRD may wish to consider upgrading the Langford CAD system to ensure an interface to BCAS Intergraph CAD for the timely receipt of first medical responder calls. Victoria Fire
should consider in a similar fashion for the calls it receives from BCAS. It should be noted that the CAD system in both cases is fully capable of such an interface and at least in the case of Langford this work was being scheduled at the time the report was being prepared.

In general the benchmark departments are highly protected as discussed earlier and come closer to meeting the security needs identified in NFPA 1221. Of the dispatch facilities in the CRD, both Langford and Victoria should review their centres in comparison the 1221 standard to ensure that access to the dispatch centres is physically separated and has controlled access that is limited to those individuals with authorization to be present.

### 3.5 Performance

On balance the performance of the three fire dispatch operations in the CRD is within the range of the benchmark departments, none of which were in compliance when they were reviewed within the past 24-36 months.

As noted earlier, performance against a defined target is a relatively new concept, with a dispatch standard that has been revised (downward) within the past 15 months. The dispatchers and managers in each of the CRD fire dispatch centres were generally aware of the performance requirements and are committed to introducing measures to address any shortcomings.

One caveat with comparing performance between these three centres is the degree to which their performance is not a true ‘apples-to-apples’ comparison as their CAD systems operate somewhat differently and their call management processes and timestamps are not identical. One goal would be to consider a review of dispatch processes to align system configurations to address this and to ensure that at all times the call management processes coincide with the objectives of the NFPA 1221 Standard.
4. **Abbreviations**

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<tr>
<td>RMS</td>
<td>Record Management System</td>
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<tr>
<td>SOP</td>
<td>Standard Operating Procedure (or Policy)</td>
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<tr>
<td>ULC</td>
<td>Underwriters’ Laboratory of Canada</td>
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<tr>
<td>UPS</td>
<td>Uninterruptable Power Supply</td>
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