

**APPENDIX E**  
**PEI 911 CAD Standards**

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## Introduction

A computer aided dispatch (CAD) system consists of either a single software application or a suite of integrated software packages used to initiate a public safety call for service (CFS) record, to dispatch, to maintain the status of responding units and resources in the field, and to generally manage the incident. It is typically used by emergency communications dispatchers, call takers, and telecommunicators in public safety communications centers.

The CAD system is one of the most important tools utilized by a Public Safety Answering Point (PSAP). All reported incidents are entered, dispatched, managed, and tracked via the CAD system, making it a mission critical system. The CAD system is the primary tool used for public safety resource management.

This document will highlight some functionality that will be required for a PEI CAD, but is not meant to be a CAD standards document. The PEI 911 will require a CAD that provides the following functionality:

- Call Handling/CAD Event Creation
- Business Function: CAD System Administration
- System Functions
- Reporting and Monitoring

The use of the word shall refer to a requirement, whereas the word should means that a specification is merely requested.

## Call Handling/ CAD Event Creation

The system should provide users an automated process to verify, analyze, classify, and prioritize CFS before electronically routing them to dispatcher(s) or to other appropriate destinations, such as Secondary Service Access Point (SSAP).

Information is gathered from the first 911 caller and entered into the CAD system using a CAD event data entry screen. The call taker enters the event's location into the CAD system and selects the appropriate event type based on information provided by the reporting party. The call taker enters the event so the CFS can be simultaneously sent to the appropriate law enforcement, fire, and EMS dispatch positions. The CAD system will also need to be able to receive incoming ANI/ALI for a 911 call and automatically create an event.

The call taker will continue to gather additional information from the reporting party and

updates the CFS record. Each involved dispatcher receives notification that the CFS has been updated and is able to view the updates.

Additional calls may come from the same incident, as call takers begin the data entry process, the CAD system alerts them that a CFS is currently active for the same location and has a similar event type. The call taker can then determine whether the new reporting parties have additional information that was not reported by the initial reporting party. A new CAD event entered but later determined to be a duplicate of a CAD event already in progress can be flagged in the CFS record as a duplicate and have the ability to merge data into the original incident. Pertinent details gained from these new reporting parties can be provided as updates to all involved dispatchers and field responders.

## Call Handling

A reporting party initiates the CAD process by reporting an incident to a public safety answering point. Reporting parties consist of citizens, electronic devices (*e.g.* burglar or fire alarm), agency staff, and other agencies requesting services from the agency or giving notification of events or activities of concern. An incident notification may come from many different points of origin, such as alarm systems, personal monitoring devices, Enhanced 911 (E911) systems, direct calls (10 digit numbers), walkins, CAD-to-CAD interfaces, two-way radios, and other Web-based systems.

*Call taking (handling)* consists of:

- Receiving the call or other notification;
- Obtaining sufficient information from the reporting party;
- Determining if the event reported is a duplicate of an incident in progress; and,
- Recording or updating the CFS in the CAD system.

The call taker may also apply procedures and guidelines to verify, analyze, classify, and prioritize the CFS prior to routing it to appropriate dispatch positions.

In order to support the Call Handling function, the CAD system:

- **Shall** import and attach/append, automatically upon user command, automatic number information (ANI) and automatic location information (ALI) to a CFS.
- **Shall** import (automatically) a CFS received from another CAD system.
- **Should** import (automatically) a CFS generated on a Mobile data computer (MDC).

## CAD Incident / Event Types

*CAD incident/event types* describe the nature of “what is happening” at an incident. They are codes that describe the various types of incidents that can be received by a PSAP.

A *CAD incident type* (nature code/event type) can initiate multiple CFS events if the incident type is determined to require a multi-agency response

The CAD system should allow the local agencies using them to define and update their own sets of incident types as required.

## Cancelled Events

CAD system users should be able to enter an event that bypasses a transfer to dispatch, but that assigns a resource with a disposition and closes the event upon entry with the user designated disposition. This cancelled\* event should be included in the location history of the location where the event occurred. It should be possible to associate cancelled events with a logged-on employee's identification. A cancelled event identifier in the event history should differentiate it from normal events.

In order to support the *CAD Incident / Event Types* function, the CAD system:

- **Shall** allow for system administrator defined CAD incident types or nature codes.
- **Shall** allow system users to modify the incident type and provide new/updated response plan information/suggestions based on the new incident type.
- **Shall** provide the capability to create an event, assign a unit, and close the event with a disposition without going through the transfer/dispatch process steps.
- **Shall** allow the system administrator to define disposition codes.

## Update Call for Service Event Data

Communications center personnel must be able to enter narrative data and the reporting parties' information into the CFS record at any time before and after the event is closed.

In order to support the *Update Call for Service Event Data* function, the CAD system:

- **Shall** permit multiple users the ability to enter supplemental (new) information into the CFS event record of one or more user - specified CAD events.
- **Shall** create an automatic time/date stamp for every transaction related to an event, and *shall* store the responsible operator's identification (**ID**), the console ID, and the nature of the change.
- **Shall** store old entry information, with the appropriate date, time, operator ID, and console

stamps if the new entry replaces existing information in the event record.

- **Shall** create a permanent audit trail for all information recorded related to an event, whether or not that information is later modified or deleted.
- **Shall** support ease of entry for supplemental event information and changes to existing event information.
- **Shall** allow the user to add supplemental information and/or change active events.
- **Shall** allow the user to update any field in the CFS event record (except user- designated fields, such as application-generated times and date stamps, operator identification information, ANI/ALI information, and CAD position that completed a CAD transaction).
- **Shall** document all changes and supplemental information in the event history.
- **Shall** provide an event update/change data entry screen.
- **Shall** require confirmation from the user when attempting to update any field in a closed event.
- **Shall** allow the user to supplement and/or change active events.
- **Shall** allow the user to supplement and/or change any field of a closed event without having to change the state of the event and have the ability to notify responsible dispatcher and or responder.

## Determine Dispatch Need

For every CFS, a decision must be made as to whether to transfer to a SSAP to dispatch resources or to close the CFS with an explanation of why the CFS was transferred.

If the information gathered indicates that a public safety response is not warranted, based on local policies and protocols, then the CFS should be closed with a disposition code and, where appropriate, narrative/comment information that explains why no resources were assigned to the event.

If a decision is made that resources are required, then the collected information must be routed to a dispatch position to begin the resource assignment process. As noted throughout this document, these two functions (call taking and dispatch) can be performed by the same person.

In order to support the *Determine Dispatch Need* function, the CAD system:

- **Shall** provide the capability to close out the CFS record without assigning a resource, if it is determined that a CFS does not require the assignment of a resource(s).
- **Shall** allow the user to append a disposition code and comments to events that are not assigned any resources.

## Assign Incident Classification and Priority

One of the key pieces of information utilized in CFS event creation is incident/event classification. This process will determine the appropriate agencies for dispatch and response needs.

A list of pre-defined incident type codes created by the system administrator is presented to CAD users to allow the most appropriate incident type to be selected.

In order to support the *Assign Incident Classification and Priority* function, the CAD system:

- ***Shall*** provide the ability to generate a CFS event with only the location and incident type code entered.
- ***Shall have the ability to limit priorities that can be assigned based upon call type and configurable by the administrator.***

## Check for Duplicate Incidents

CAD systems must be able to automatically evaluate an entered incident's location and call type to determine whether it is a duplicate or new CAD event. The duplicate event detection process must be based on pre-determined geographic search parameters that include exact street addresses, street addresses within the same block, system administrator configurable radius searches around the geo-coordinates of the incident location, and/or other system administrator defined search parameters. The CAD system should analyze all open events, as well as closed events, within an administrator configurable time period. Upon indication by the CAD system of a possible duplicate event, CAD system users must be able to evaluate the duplicate event detection information presented by the system to make the final decision of whether new incident notifications are duplicates of a previously entered CAD event.

If the new incident is determined to be a duplicate, then CAD users should be able to add any new information contained in the current CFS entry screen and link the new information to the primary active CFS record without having to re-enter it.

In order to support the *Check for Duplicate Incidents* function, the CAD system:

- ***Shall*** identify during the creation of a CFS event whether the event is a potential duplicate of an active CAD event or an event recently closed; and, ***Shall*** notify the call taker of the results.
- ***Shall*** present the user with the following information for each potential duplicate event if potential duplicates are located:
  - Incident ID
  - Type of incident

- Location of the incident
  - Status of the incident
- *Shall* allow the user the ability to create a new CFS event and link the event to the primary event record; or, to merge any new information contained in a duplicate event into the main event record associated with the identified duplicate CAD event.
- *Shall* allow the call taker to re-open closed CAD events that are duplicates of a new event, add additional information to the re-opened CAD event records, and, if necessary, re-route them back through the dispatch process.
- *Shall*, based on agency policy, restrict users from changing or deleting any previously entered data contained in re-opened closed CAD events.

## Incident Information

Call takers acquire *incident information* (e.g. the reporting party's name/address/phone number, incident location, narrative details, incident location, affected business name, incident location directions) from reporting parties and automated devices. Depending on how the reporting party contacts the PSAP, some of this information, such as ANI/ALI, is available through digital displays and interfaces.

Either before being entered into CAD or immediately after (if automatically loaded into CAD via an electronic interface), all of this information must be verified and validated. CAD systems must provide an ergonomically structured, easy flowing graphical user interface (GUI) that can be used to enter and/or validate incident-related information.

Although call takers need to be able to enter information into CAD in any order, the location, nature of the incident, and caller phone number are prioritized: call takers typically interact with reporting parties in a structured manner that enables obtaining these three critical components of the incident as quickly as possible. Once these critical components are obtained and verified, and depending upon the priority of the incident, CAD must be able to route this partially completed event record to appropriate dispatchers so that resources can be assigned and dispatched while call takers continue collecting other incident information from reporting parties.

Structured, drop-down, data entry fields should be available for those emergency event-related data that lend themselves to standardization (e.g. height, weight, priority, nature code/type, incident location). Free format fields (e.g. text comments and descriptive fields) should also be available as needed. CAD system users should be able to enter text in a non-case sensitive format, as well as to use search, replace, spell-check, and other text editing features when appropriate. CAD systems should provide the ability to enter an unlimited number of comments/narrative details.

As NG911 capabilities become more widespread, CAD systems should be compatible with handling NG911's enhanced media content (*e.g.* pictures, text, streaming audio and video, and telematics data streams), including the display, storage and retrieval of this information from the CAD system and/or an interfaced recording device/system.

In order to support the *Incident Information* function, the CAD system:

- **Shall** provide the ability to create a CFS with minimum required fields (*e.g.* location and event type).
- **Shall** provide the ability to transfer to dispatch once location and nature are obtained.
- **Shall** provide the ability to alter/augment event as further information is obtained by the call taker.
- **Shall** include an automated connection/interface to the 911 telephone system to use ANI/ALI data to populate the incident entry screen form.
- **Shall** provide the ability to use ANI/ALI data to assist with CFS entry.
- **Shall** provide the ability to enter unlimited narrative with text wrap-around feature.

## Location Verification

CAD event locations should always be validated (*i.e.* checked) against a geographic file that includes all of the current addresses for the area under the control of the communication center. CAD systems should contain an easily-invoked tool to assist users in validating entered locations. The tools may vary in how they operate, but should include prompts and ordered lists that present the user with suggested addresses/locations when the exact address cannot be validated.

Locations that cannot be verified provide an indication that the location information may be inaccurate. In these situations, the call taker may need to collect additional information that may be stored in a narrative format (*i.e.* as comments) in the CAD event record to assist dispatchers in assigning the proper resources, as well as guiding emergency responders to the correct location of the incident.

Location information for common places and landmarks should include a street address cross-reference or appropriate geo-coordinates that provide the legal street address/location for that common place/landmark.

Location validation information and other geographic data are typically contained in the CAD system's geofile. Geofiles typically contain street centerline information, along with appropriate latitude, longitude and, optionally, altitude information for each street center line segment, as well as attributes describing the addresses contained on each side of a street

centerline segment. In addition, CAD systems should support structure file-based geofiles that contain street center line data, plus all of the unique structures within a portion of (*e.g.* the urban portion) or the entire CAD system's service area.

As NG911 call routing and media support are implemented, CAD systems will have to support increasing levels of detail—for example, in the future under NG911, parcel and structure boundaries may need to be supported by CAD geofiles.

The CAD system's geofile should assist users to:

- Validate the street name is an actual street in the service area
- Resolve ambiguities, while accounting for spelling variations and duplications
- Validate intersections
- Validate address ranges
- Relate common place names to actual addresses
- Relate latitude, longitude, altitude (X,Y/Z) coordinates to an actual address Transform latitude and longitude to map coordinates for display Translate incident locations to agency reporting areas
- Translate alias names to actual street names Display high and low cross streets
- Display city and county, neighborhoods/localities
- Assign and display the law enforcement, fire, and EMS response areas containing an incident. Assign and display the law enforcement, fire, and EMS map pages where an incident is located. Display CAD system premises warnings or hazards based on the location of incident(s). Display CAD system premises warnings or hazards based on the incident type that are within a configurable radius of incident locations
- Display prior incidents that occurred at an incident's location within a configurable period of time
- Display nearby fire hydrants
- Display nearby incidents (user-defined criteria)

In order to support the *Location Verification* function, the CAD system:

- **Shall** provide the ability to enter a unique building and unit number to clearly identify the location (*e.g.* 100 West Ave., Bldg. 2, Unit 1).
- **Shall** depending on the permissions granted to the user, provide the ability to edit ALI 911 information in the event record if the information provided by the phone company is incorrect.
- **Shall** include the following fields for all records containing an address: street number; apartment/suite number; street; road type (Drive, Avenue, Street, Alley); direction; city, province, and/or postal code (modify list as appropriate).
- **Shall** validate entered incident addresses against the CAD geofile.
- **Should** provide various suggestions to assist users in selecting accurate incident locations.
- **Should** organize the display of possible address matches in an ergonomic, easily understood

manner that aids users in identifying valid incident locations.

- **Shall** allow authorized users to configure their tactical map display to show jurisdictional boundaries (e.g. city boundaries) and to display potential valid incident locations by jurisdiction.
- **Shall** allow the user, in case the location entered by the user is unverifiable (e.g. the location does not exist in the geofile), the capability to exit or bypass the verification process and manually route the CFS event(s) to the appropriate dispatch position(s).
- **Shall** provide the ability to enter a partial street name, with a minimum number of characters, and be presented with a list of possible matches to pick from for an exact match.
- Should provide the ability to enter misspelled street name and be presented with a list of possible matches.
- **Shall** provide the ability to enter an incorrect street address for a correct street name and be presented with a list of valid ranges.
- **Shall** provide the ability to override the CAD system's geofile by manually entering valid response area data.
- **Shall** provide the ability to enter a reason for an overridden location.
- **Shall** provide the ability to generate a report of geofile overrides.
- **Shall** provide the ability to display the incident location in relation to other active incidents on the system's tactical map display during the CAD event entry process.
- **Shall** provide the ability to create an event by using a selected map location.
- **Shall** provide the ability to create common or known locations and provide alerts when event is created within vicinity.

## Retrieve Incoming Calls

Automatic Call Distribution (ACD) system, where priority calls are routed to the next available call taker and non-911 calls are also routed to an available call taker based on local PSAP policies.

As previously described, ALI data that contains the caller's specific location is presented to the call taker for landline and VoIP E911 calls. For wireless 911 calls, the ALI contains the caller's general location under WPH1 and a more detailed X, Y coordinate location under WPH2. ANI is provided for all incoming E911 calls, and possibly 911 and non-911 calls, depending upon how the system is designed.

CAD systems should be interfaced to the Customer Premises Equipment (CPE) to facilitate the automatic passing of ALI/ANI data to the CAD system. The CAD system should automatically initiate a CFS for every 911 call received and populate the CAD incident entry form with the location and call back telephone number of the reporting party. The call taker can then continue to collect and enter the remainder of the incident information available from the reporting party.

Our 911 telephone system allows the call taker to rebid a wireless 911 caller's current location

when the system utilizing WPH2 technology and the incoming call has been flagged as such. This feature is helpful if the caller is moving. The rebid feature will cause the ALI information to be refreshed with the reporting party's current location. It should be possible to, upon user command, import the updated location information from the telephone system into an appropriate area of the CAD event data entry screen.

In order to support the *Retrieve Incoming Calls* function, the CAD system:

- **Shall** include an interface to the 911 telephone system that, upon receipt of a 911 call, causes the automatic creation of a CFS and transfer of caller's ALI information, from the telephone system to an appropriate field of the CAD event data entry screen.
- **Shall** transfer the caller's call-back telephone number information if it is available, from the telephone system to an appropriate field of the CAD event data entry screen.
- **Shall** transfer, depending on PSAP policy, the telephone subscriber's name to a field in the CAD event data entry screen's calling party's name data field.
- **Shall** include data fields within the CAD event data entry screen for reporting party's name, address and callback number.

### **Determining Response Agency and Service Area**

The service agencies responsible for responding to an incident must be determined from the event's location. Often, the ESN information that arrives with E911 calls, or the WPH1 tower sector that received the call, specifies the agencies responsible for the call origination point; however, the caller's location is not always the location of the incident. Wireless calls often arrive with only either a general X,Y coordinate representing the general area where a call originated (WPH1) or a detailed X,Y coordinate that represents the actual location of where the call originated (WPH2).

In either case, a point in polygon (**PIP**) or similar analysis must be performed to determine the service agencies responsible for the call's location but, again, the caller's location may not correspond with the actual event's location—therefore, the actual event location must be obtained from the caller and then validated against the CAD system's geofile to identify the law enforcement, fire, and EMS service agencies responsible for a new CAD event. The event type will help determine which service agencies must respond.

In order to assign field resources to a CAD event, the service area (*e.g.* fire response zone, police response area, EMS response area) must be determined. CAD systems must be able to use the event's validated location information (*e.g.* civic location, X, Y coordinate, street intersections) to determine the response area where the event is located for each service agency involved in the event.

- **Shall** store all service agency and response area assignments in CFS events and the system's audit log file.
- **Shall** identify the new CAD event's location and nature code, and use the system's geofile to identify the appropriate service agencies that need to handle the event.
- **Shall** use the service agency and response to notify the appropriate dispatchers that they must process a CAD event.
- Should have the ability to recommend responders, response agencies based upon call type and priority details.

## CAD Event Routing

The CAD system must be able to route CFS events to appropriate agencies after call takers have entered sufficient data for their dispatchers to begin assigning and dispatching resources to the events. Typically, call takers and dispatchers need to work closely with each other—so the CAD system must be able to instantaneously (*i.e.* near real time) share new information entered into an CAD event records between all of the positions (call takers, dispatchers, supervisors, etc.) working the event.

Even though, communications centers may operate in a combined positions format where both the call taker and dispatcher are at the same position (telecommunicator), it is still desirable for the CAD system to be able to route CFS events and share information between positions—for example, law enforcement may arrive on the scene of an event and discover that fire and/or EMS resources are needed. The law enforcement dispatcher controlling the event must be able to route all of the relevant incident information collected to the appropriate fire and EMS positions without either position needing to manually re-enter any incident data.

CFS event routing can also involve a secondary PSAP, where CFS events are routed to a secondary PSAP via CAD-to-CAD or some other interface.

In order to support the *CAD Event Routing* function, the CAD system:

- **Shall** examine the location, event type and response plans (when dedicated dispatch positions are in operation) to route the CFS event to one or more dispatch positions as the CFS event entry is being performed by a call taker.
- **Shall** have the ability for CFS routing to a secondary PSAP if the secondary PSAP operates the same CAD system independent of the primary PSAP's CAD system.
- **Shall** have a CAD-to-CAD interface for CFS routing to a secondary PSAP if the secondary PSAP operates its own CAD system independent of the primary PSAP's CAD system.

## **Business Function: CAD System Administration**

System administration is a core function of a CAD system. The various administrative functions and capabilities described below are required to keep the CAD system current and operational. Some of these administrative functions and capabilities should be completed on a daily or weekly basis; others are completed according to a predefined schedule; while others are only completed on an as needed basis. Since these CAD administrative functions and capabilities are frequently used by non-technical personnel, they should be implemented in the CAD system with ergonomically structured GUI so they can be easily accomplished.

Whenever a new street is built or a response area changes within the geographic area for which a CAD system is deployed, the geofile used by the system should be updated to reflect the changes. The CAD system will need to have the ability to be updated by the agencies CAD administrator, as these files need to be updated regularly.

Confidential information is often processed and disseminated by the CAD system, and the system's security parameters should be continuously monitored and updated to ensure confidential data is properly handled and stored. In order to meet legal obligations and to support post incident analysis, all transactions performed by the CAD system and its users should be logged in a secure, confidential manner.

The CAD system's configuration parameters should be routinely updated to reflect changing dispatch policies, added or modified emergency units/apparatus and personnel, and other changes that occur in the dispatch environment.

Many of a CAD system's functions, such as the available incident types, field resource and apparatus statuses, are controlled by data stored in the CAD system's tables. Technically, these are describing database administration functions and, depending on the size of the jurisdiction, can be a separate responsibility from the system administrator. Techniques and procedures should be available in the CAD system to update these tables to keep them current with changing policies, operational procedures, resources and units/apparatus, and other changes in the system's environment. The CAD system should also have the ability to temporarily assign/remove equipment and resources as required by the agency.

If the CAD system should be taken off-line or becomes inoperable due to an unforeseen situation, then a facility should be available within CAD once it becomes operational again to enter incident, resource deployment, and responder actions that occurred while the CAD system was down.

## Geofile Maintenance

The CAD system's geofile is used for a variety of CAD functions including:

- Validating and standardizing location and address information
- Assigning response agencies to an incident's location.
- Assigning (automatically) geographic boundaries (e.g. agency of jurisdiction, law enforcement response zone, fire response zones, sectors, neighborhoods, communities) to an incident's location.
- Determining the nearest confirmable address in the vicinity of a wireless emergency call.

The CAD system's geofile should be updated to reflect changing conditions in the field. Typical changes that require a geofile update include:

- New street constructions
- Response agency boundary realignments
- New site/structure construction
- New and changing Landmarks (e.g. new parks, new names)
- Changes in descriptive (attribute) information stored in the geofile, including changes in attributes [e.g. street and landmark names, boundary IDs, address ranges of road center line (RCL) segments]

The CAD system's geofile can be maintained in three ways:

- 1) Using direct tools available within the CAD system (given the appropriate user permissions);
- 2) Uploading and/or converting a GIS-maintained set of geospatial datasets into the CAD system's internal geofile; and,
- 3) Uploading and/or converting (under NG9-1-1) the i3-compatible geospatial dataset from the appropriate Spatial Information Function (SIF).

Since the geofile is the basis for many CAD system decisions and functions, it is critical that the geofile is continuously monitored and updated on a timely basis.

NG911 emergency call routing, response agency assignment, call transfers, and other functions are performed through the use of GIS information. In order to avoid confusion and to minimize errors, the CAD system and the NG911 system should be using the same source of GIS data.

## Typical Geofile

The typical CAD geofile contains points (addresses), lines (RCLs) and polygons (relevant boundaries), as well as metadata comprised of attribute information, including address ranges for each street segment and structure/site locations with their associated addresses.

In order to support the *Geofile Maintenance* function, the CAD system:

- **Shall** validate all locations entered into or processed by the CAD system against the CAD system's geofile.
- **Shall** provide an interactive, GUI-based address matching tool for assisting users to determine the location of incidents that do not have an exact geofile match for their initially entered location.
- **Shall** be capable of determining X, Y coordinate values that represent the location of incidents whose locations have been validated.
- **Shall** be capable of displaying coordinates anywhere on the map with mouse over.
- **Shall** support coordinate based operations including X, Y, Lat/Lon.
- **Shall** make possible integration of the CAD system's geofile with Global Positioning Satellite (GPS), AVL, and Automatic Person Location (APL) systems.
- **Should** support X, Y coordinate-based geographic searches for such things as nearby hazardous materials, duplicate incidents, and premises information at or near an incident's location.
- **Shall** be capable of importing geographic boundary information (e.g. station boundaries, jurisdictional boundaries, reporting districts, response zones, neighborhoods) from GIS and other geographic data sources.
- **Shall** be capable of importing topologically-structured street networks and other linear features (e.g. rivers, streams, utility right of ways, bus routes) from GIS and other geographic data sources.
- **Shall** be capable of importing point data (e.g. landmarks, parcel, address points, business locations, retail store address points, fire hydrants) from GIS and other geographic data sources.
- **Shall** be capable of importing other types of geographic data (e.g. park boundaries, rectified aerial photography, trailer parks, apartment complexes) from GIS and other geographic data sources.
- **Shall** include location databases such as hazards, general premises information, street closures, and other user-definable GIS type data.
- **Should** support parcel-level GIS information and use this information for address/location verification
- **Should** support multiple layers of information; for example, the storage of building footprints, aerial photographs and other images (*i.e.* pictures of specific buildings) that are associated with specific areas and addresses.
- **Shall** maintain the CAD system's geofile while the system is live and operational.
- **Shall** support boundary assignments (*i.e.* determining the response zone and jurisdiction for each incident) in real time by processing the incidents X, Y coordinates against the RCL and/or address point file, and the appropriate boundary files.
- **Shall** support duplicate incident checks based upon the location of the incident.
- All incidents located within the CAD system's duplicate incident search radius [**Shall**] be checked as potential duplicates.
- **Should** meet i3 standards and functions in order to comply with NG911 requirements.
- **Shall** include interactive tools for validating the accuracy and completeness of the geofile.

- **Shall** generate an audible and/or visual alert when any potential duplicate incidents are identified.
- **Shall** include the capability for manually editing and entering any geographic data required by, or imported into, the system's GIS (given the appropriate user permissions).

## Security

Sufficient security should be available within the CAD system to prevent unauthorized access to system modules and data. Confidential, tactical and life critical information and functions are stored and available within most CAD systems. This information and functions should only be accessed by authorized individuals.

CAD system security typically involves establishing a set of roles (*i.e.* security groups) within the system and enabling a set of system access privileges for each role. System users are assigned to a role, which then establishes their credentials and permissions within the system. Alternately, each user may individually be assigned CAD system access privileges.

In order to support the *Security* function, the CAD system:

- **Shall** provide appropriate safeguards to ensure that only authorized devices and users are allowed access to the CAD system and stored information.
- **Shall** provide a security profile to control individual user access to the various modules, applications, functions, features, and data available within the CAD system.
- **Shall** validate each user's credentials through a mandatory logon process before being granted access to any functions or data available within the CAD system.
- **Shall** enable a user replacing an existing user to quickly log off the existing user and logon without the need to exit from CAD or re-start the CAD application (*i.e.* when two-factor authentication does not apply.)
- **Shall** enable system administrators to create and maintain a centralized and indexed database containing information about each system user, including their unique user ID, password, contact information, and security profile.
- **Shall** enable system administrators to define individual user access privileges and assign them to security groups.
- **Shall** provide a method for authorized users to reset a user's password.
- **Shall** associate the user ID and workstation ID with all CAD system transactions, including data entry and report generation.
- **Shall** limit access to the centralized user security database to only specifically authorized users.
- **Shall** establish security profiles that are assigned to individual users or user groups based on personnel classifications (*e.g.* call taker, dispatcher, system administrator, and supervisor).
- **Shall** prohibit deletion of any data entered into a CFS event.

- **Shall** provide application and module level security that enables certain users to access specific CAD system functions and application modules, while keeping other users from accessing these same functions and modules.

## System Functions

### Remote Access

A CAD system supports remote access by users outside of the communications center. This access includes permission-based views of CAD system data by certain workstations and/or individuals. Remote access should include security-controlled, web based access. The system is also capable of remote access from a separate location, such as a mobile command post or a secondary location

In order to support the *Remote Access* function, the CAD system:

- *Should* support remote access by users outside of the communications center.
- *Should* provide access that includes permission-based views of CAD data by certain workstations and/or individuals.
- *Should* provide remote access that includes security-controlled, web-based access.
- *Should* be capable of remote access from a separate location, such as a mobile command post or a secondary location.

### Date and Time Stamps

Time stamp overrides are security protected and any changes are documented on the incident, including the ID of the person performing the modification and the reason for the modification.

In order to support the *Date / Time Stamps* Function, the CAD system:

- **Shall** stamp date/time and log CAD activities, such as status changes, task accomplishments (i.e. Call Initiated, Time call was answered by call taker, Time Call was transferred to secondary PSAP, Time call was answered by agency), and notifications as well as many other system transactions and the time they occur.
- **Shall** save original time stamps even if they are overridden.
- **Shall** protect time stamp overrides; and, any changes [*Shall*] be documented on the incident, including the ID of the person performing the modification and the reason for the modification.
- **Shall** maintain all time stamps to be minimally accurate to the second (e.g. hh:mm:ss).

## Multi-Agency / Multi-Jurisdictional Capability

The CAD system provides the capability to seamlessly create multiple independent and linked incidents for each agency or jurisdiction associated to the incident without duplicating any data-entry.

The CAD system can determine the need to automatically generate multiple CFS events related to a single incident, or to transmit CAD data to external systems based on various pre-designated factors, including: CAD incident type, incident location, incident resource recommendations, or combinations of these factors.

In order to support the *Multi-Agency / Multi-Jurisdictional Capability* function, the CAD system:

- **Shall** have the ability to create a CFS event for user-defined multi-agency events and route the CFS event to the appropriate agency dispatch position(s).
- **Shall** have the ability to create a linked CFS event for each required agency and route the CFS event(s) to the appropriate dispatch positions when an event involves more than one agency.
- **Shall** provide the ability to transfer an active CFS event to another agency without closing the CAD CFS event within the originating agency.
- Should be able to recommend resources/equipment/agencies based upon the call type priority.

## Reporting and Monitoring

Reporting and monitoring are important components of a CAD system. Reporting functions should include the ability for the command staff to generate statistical, detail event and log reports, and may include some form of snapshot/incident replay as well. CAD systems should also have the capability to manage the workflow of the call takers to include training and testing functions.

## Supervisor Support

The CAD system should provide the supervisor with the ability to monitor the activity on any call taker workstation. If necessary, a supervisor needs to have the ability to take direct control over a call takers position remotely, without leaving the supervisor console.

In order to support the *Supervisor Support* function, the CAD system:

- **Shall** provide the ability for a CAD supervisor, or another call taker with appropriate system permissions, to observe the activity of a given call taker including the pending events queue, active events, available units list, and map.

- **Shall** enable a supervisor, or another call taker with appropriate system permissions, to co-address the duties under the control of another call taker.

## CAD Management Reporting

It is essential that the CAD system include standard reports that can be run using a variety of flexible parameters. New reports should be defined either through the CAD system or a third-party reporting tool, and then should be stored as a standard report available through the CAD system.

The functionality needs to include the ability to report any data element by any other data element in the system. This may also include the ability to export data for use in third-party tools. A wizard may be provided that allows for user-generated reports.

Examples of typical CAD reports include the following reports that can be run by user-defined date and time range:

- Activity analysis
- By day and hour
- By day of the week
- By hour of the day
- By specified geographical area and by time period
- Attempted breaches in security
- Daily log showing all incidents received for the prior 24 hours from time of printing
- Delay reports (*e.g.* within dispatch, by unit from ‘notified to en route’, ‘en route to arrive scene’)
- Incident summary by specified geographical area and by time period
- Response time analysis
- By incident type
- By specified geographical area and by time period
- Time consumed
- By day of the week and hour of the day
- By incident type by hour of the day
- By specified geographical area and by time period
- Workload activity
- By group
- By resource
- Snapshot / Scenario / Incident replays
- Call Source – (ie.911 calls, 10 digit dial, transfers)

Error messages should be available for identifying system problems. Customizing reports to

meet department needs should also be an option.

In order to support the *CAD Management Reporting* function, the CAD system:

- **Shall** include standard reports that simultaneously use date, time, location, and/or incident type search parameters for report definitions.
- **Shall** include the capability of customizing standard reports and for creating user-defined reports.
- **Shall** provide access to all reports to the user, subject to permissions, from within the CAD system.
- **Shall** provide an *ad hoc* reporting capability.
- **Shall** provide a data exporting capability.

### **Training and Testing**

This function relates to the necessity of having a training and/or testing CAD system environment that is isolated from the production environment for the purposes of program testing and file maintenance testing, as well as training of new personnel. This function is often referred to as a *CAD training mode*.

To the greatest extent possible, the training environment should be identical to the production region, thus allowing accurate testing and training to occur without impacting the production environment.

In order to support the *Training and Testing* function, the CAD system:

- **Shall** include a training environment that accurately mirrors the live environment, including all tables and administrative configurations, and allows for call takers and dispatchers to train on specific services (*i.e.* law enforcement, fire service, and/or EMS) and on pre-configured geographic areas identical to that of the live environment.

The CAD system's training environment:

- **Shall** have a separate E911 test connection or canned script E911 information and provide realistic training regarding incoming E911 data.
- **Shall** be able to be used, operated, started up, shut down, and updated to match the live application without affecting the live environment.
- **Shall** be able to be used to test modifications and updates to the live CAD application prior to implementing the modifications and updates in the live environment.

### **Linking an Audio File to a CAD Event**

Audio logging, also referred to as recording, is a significant component in the PSAP technology infrastructure. This is the act of recording forms of audio and video in a PSAP such as: the 911

telephone call, radio system, console-to-console intercom, administrative lines, NG911 video, CAD screens, ANI/ALI, and direct connect ring down telephone lines.

The ability of the CAD system to associate a CFS event record with the captured audio for that incident is imperative during the Quality Assurance (QA) process and for rebuilding the scenario that occurred. This functionality is also required when reconstructing an event for public disclosure requests and/or court cases.

As NG911 is still being developed, other incoming media types will need to be included in this process as they are introduced.

In order to support the *Linking an Audio File to a CAD Event* function, the CAD system:

- *Should* provide the ability to record multiple types of incoming media types and associate them with the CAD CFS event record for easy retrieval.
- *Should* provide the ability to add additional types of data to this association as they are developed.
- *Should* provide the ability to associate a CAD incident with audio logging/recording.

### **Send Data to Records Management System**

Incident history (i.e. complete details on closed incidents) is typically maintained in a CAD system for a period of time based on operational requirements and/or state record retention rules. The CFS event is maintained in the CAD system to provide access to that database on a series of retrieval keys and/or parameters, (e.g. incident/event number, location, or date/time range). Incident history applies to the complete incident CFS events, initial incident information, unit assignments, status changes, imbedded inquiries and responses, triage requests and results, comments, cross- references). Everything that was recorded during the taking and handling of the incident is available to the appropriate RMS integrated or interfaced with the CAD system, depending upon their design and configuration.

Depending on operational requirements, long-term storage of CFS event history records may be relegated to an RMS or a stand-alone incident system. If so, then the incident history system is used for data look-up and information retrieval, and it may also support extended statistical analysis processes based on types of events, response times, incidents by area, date/time, and so on. Because of the need for statistical analysis, incident history data needs to be structured to facilitate identifying specific types of data. This data should be made available to the appropriate RMS.

In order to support the Send Data to Records Management System function, the CAD system:

- *Shall* provide the ability to exchange all CFS event information with the local RMS, Police Reporting and Occurrence System (PROS).

- **Shall** provide the ability to obtain information from Canadian Police Information Centre (CPIC) for the purpose of obtaining information relevant to a CFS.
- **Shall** provide the ability to obtain information from Prince Edward Island Driver Vehicle System (DVS) for the purpose of obtaining information relevant to a CFS.

## Next Generation 911

NG911 will update and modernize the 911 service infrastructure in Canada to improve public emergency communications services in a wireless, mobile society. NG911 will enable additional communication media, as well as almost totally revamp the methods that are currently employed to route and deliver emergency calls to 911 service centers. In addition to calling 911 from a phone, the public will be able to transmit text, images, video, and data to the 911 service center.

Landline-based phones will have their locations pre-validated, increasing the likelihood that they will be correctly routed to the proper 911 service center. GIS technology will be used to route calls to the proper PSAP through a highly secure Emergency Services IP network (ESInet), rather than through traditional 911 trunk lines. Additional service responder types, such as poison control and Hazmat, will be supported in both a regional and local manner. Backup and failover availability will be driven by policies and seamlessly integrated with the ESInet. Extensive telematics type devices (*e.g.* personal health monitoring devices, accident detection devices) will also be supported under NG911.

To be compatible with NG911, CAD systems, at a minimum, will have to support the display, storage, retrieval, and forwarding to mobile data devices of the additional emergency-related media supported by NG911, such as text messages, images, telematics information, and streaming video and audio.

Any CAD system to be deployed in PEI will need to demonstrate their companies' plans to migrate or evolve their current technology to meet the future needs of Next Generation 911.