

NENA/APCO Human Machine Interface & PSAP Display Requirements (ORD)



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NENA's Operations Committee has developed this document. Recommendations for change to this document may be submitted to:

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NENA recognizes the following industry experts and their companies for their contributions in development of this document.

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1 Executive Overview

NENA and APCO have jointly developed this document for the purpose of prescribing requirements for the human machine interface (HMI) display for the Next Generation 9-1-1 (NG9-1-1) System. The ubiquitous access to 9-1-1 emergency services needed in today's world of evolving technology is driving the need to introduce a broader array of interconnected networks that would comprehensively support emergency services.

The HMI within the NG9-1-1 PSAPs will assist in consolidating and presenting emergency information received via IP, cellular, telematics, sensor, and public switched telephone network (PSTN) devices to the call taker in an efficient end-user format. It will provide call takers with an interface to manage access to 9-1-1 requests for services received through virtually any communications device, provide a more direct ability to share critical data with emergency services responders providers from any location, transfer emergency calls to another PSAP, and forward the location and other critical data with the call. The HMI should be designed and configured in such a manner as to maximize a call taker's ability to efficiently manage a call.

The HMI design and configuration will include consideration as to the number of monitors, number of applications presented at once, the amount of information displayed at once, and the need to move call taker focus from one monitor/application in order to take action via key board, mouse, key pad, touch screen, and other similar devices.

2 Introduction

2.1 Operations Impacts Summary

The significant amount of Additional Data that will accompany NG9-1-1 calls requires all stakeholders to carefully examine the methods by which PSAP personnel will interact with the information they have access to.

Adhering to a standard approach for the display of information at the PSAP will provide 9-1-1 personnel the best opportunity to process calls in an expedient manner. Many funding models/cost recovery legislations mandate that a PSAP answer a high percentage of their 9-1-1 calls in 10 seconds or less. The recommendations discussed within this document will assist in maintaining the integrity of call answer times in the NG9-1-1 environment.

Implementation of a best practices standard for the display of information assures that functional design specifications will continue to meet the needs of PSAP personnel.

2.2 Technical Impacts Summary

The NENA/APCO Human Machine Interface & PSAP Display Requirements document will have an impact on the technical design specifications of the systems and applications that are used to receive and handle 9-1-1 calls. Configuration flexibility for all application displays will be required of the industry.

2.3 Security Impacts Summary

Next Generation 9-1-1 will allow authorized users the ability to display and share information between disparate systems and PSAPs in a capacity that far exceeds the capabilities of the current E9-1-1 systems. This expansion in capability will introduce new risks and vulnerabilities that must be monitored and acknowledged by all who are responsible for managing and administering components of the NG9-1-1 system. Managers and staff must be engaged and committed to maintaining the highest level of security possible. Recommendations for security policy may be referenced in the NENA NG-Security document(s).

2.4 Document Terminology

The terms "shall", "must" and "required" are used throughout this document to indicate required parameters and to differentiate from those parameters that are recommendations. Recommendations are identified by the words "desirable" or "preferably".

2.5 Reason for Issue/Reissue

NENA reserves the right to modify this document. Upon revision, the reason(s) will be provided in the table below.

| Version | Approval Date | Reason For Changes |
|----------|---------------|--------------------|
| Original | 10/20/2010 | Initial Document |

2.6 Recommendation for Additional Development Work

Next Generation 9-1-1 implementation involve a high degree of complexity that will evolve over time. It is therefore recommended that this document be reviewed on a regular basis and updated to reflect the technical and operational changes that are likely to occur.

2.7 Date Compliance

All systems that are associated with the 9-1-1 process shall be designed and engineered to ensure that no detrimental, or other noticeable impact of any kind, will occur as a result of a date/time change up to 30 years subsequent to the manufacture of the system. This shall include embedded application, computer based or any other type application.

To ensure true compliance, the manufacturer shall upon request, provide verifiable test results to an industry acceptable test plan such as Telcordia GR-2945 or equivalent.

2.8 Anticipated Timeline

Deployment or implementation will take place as required.

2.9 Costs Factors

It is assumed that implementation of NENA/APCO Human Machine Interface & PSAP Display Requirements should not have any significant affect or impact to the cost of NG9-1-1 systems or software.

2.10 Future Path Plan Criteria for Technical Evolution

In present and future applications of all technologies used for 9-1-1 call and data delivery, it is a requirement to maintain the same level or improve on the reliability and service characteristics inherent in present 9-1-1 system design.

New methods or solutions for current and future service needs and options should meet the criteria below. This inherently requires knowledge of current 9-1-1 system design factors and concepts, in order to evaluate new proposed methods or solutions against the Path Plan criteria.

Criteria to meet the Definition/Requirement:

1. Reliability/dependability as governed by NENA's technical standards and other generally accepted base characteristics of E9-1-1 service
2. Service parity for all potential 9-1-1 callers
3. Least complicated system design that results in fewest components to achieve needs (simplicity, maintainable)
4. Maximum probabilities for call and data delivery with least cost approach
5. Documented procedures, practices, and processes to ensure adequate implementation and ongoing maintenance for 9-1-1 systems

This basic technical policy is a guideline to focus technical development work on maintaining fundamental characteristics of E9-1-1 service by anyone providing equipment, software, or services.

2.11 Cost Recovery Considerations

Not Applicable.

2.12 Additional Impacts (non cost related)

Utilizing standardized HMI requirements will enable a basic set of uniformity for PSAPs. This will allow for the logical display and ease of access to data when it is available and when that information is being transferred between PSAPs. This will also allow for the receipt of recognizable messages and multimedia received at a PSAP from sources other than another PSAP.

As the number of NG9-1-1 implementations increase, tangible experience with the functionality of these systems will continue to develop. These tangible experiences will potentially drive the need for further review of this document and/or modification to the implemented NENA/APCO Human Machine Interface & PSAP Display Requirements configuration.

2.13 Intellectual Property Rights Policy

NENA takes no position regarding the validity or scope of any Intellectual Property Rights or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; nor does it represent that it has made any independent effort to identify any such rights.

NENA invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard.

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2.14 Acronyms/Abbreviations

Some acronyms/abbreviations used in this document have not yet been included in the master glossary. After initial approval of this document, they will be included. See NENA 00-001 - NENA Master Glossary of 9-1-1 Terminology located on the NENA web site for a complete listing of terms used in NENA documents.

| The following Acronyms are used in this document: | | |
|--|--|-------------------------|
| <i>Acronym</i> | <i>Description</i> | <i>** N)ew (U)pdate</i> |
| ACD | Automatic Call Distribution, Automatic Call Distributor | |
| GIS | Geographic Information Systems | |
| HMI | Human Machine Interface | N |
| PSAP | Public Safety Answering Point or Primary Public Safety Answering Point | |

DISCLAIMER: The definitions incorporated into this document are placed here until superseded by the NENA Detailed Functional and Interface Standards for the NENA i3 Solution Version 1.0 and/or the NENA Master Glossary.

| The following Terms and Definitions are used in this document: | | |
|---|--|-------------------------|
| <i>Term</i> | <i>Definition</i> | <i>** N)ew (U)pdate</i> |
| Additional Data | Data that is associated with a call, a caller or a location or PSAP. | |

| The following Terms and Definitions are used in this document: | | |
|---|--|--|
| <i>Term</i> | <i>Definition</i> | ** <i>N</i>ew <i>(U)</i>pdate |
| <i>Call</i> | A session established by signaling with two way real-time media and involves a human making a request for help. We sometimes use “voice call”, “video call” or “text call” when specific media is of primary importance. The term “non human initiated call” refers to a one-time notification or series of data exchanges established by signaling with at most one way media, and typically does not involve a human at the “calling” end. The term “call” can also be used to refer to either a “Voice Call”, “Video Call”, “Text Call” or “Data-only call”, since they are handled the same way through most of NG9-1-1. | N |
| <i>Call Park</i> | Call Park, Park, Park a Call: A feature similar to call two-way mute that enables a station user to retain a call in the system while accepting or originating another call using the same end device. Unlike call two-way mute, a parked call can be retrieved by any other user by accessing the associated call park code. | N |
| <i>Call Queue</i> | A list, string, or stack of incoming calls waiting for a connection to a telecommunicator. | N |
| <i>Call Taker</i> | An agent of a PSAP who answers emergency calls. | |
| <i>Call Two-way mute</i> | A service feature in which a user may retain an existing call while accepting or originating another call using the same end device. | N |
| <i>Emergency location</i> | The location of the emergency being reported, as provided by the caller. May be the same as the calling device location. | N |
| <i>Functional Element</i> | Functional Elements are components that comprise the application service environment of an NG9-1-1 PSAP. These elements interact to allow efficient processing of Emergency Events. | N |
| <i>Human Machine Interface (HMI)</i> | The user interface of a system, a vehicle, or an installation is sometimes referred to as the human-machine interface (HMI). | N |

| The following Terms and Definitions are used in this document: | | |
|---|---|----------------------------------|
| <i>Term</i> | <i>Definition</i> | <i>** New (U)date</i> |
| <i>Instant Call Recorder/ Instant Recall Recorder</i> | Instant Recall Recording (IRR) is a functional element that allows a telecommunicator immediate access to view or playback communications from an incoming or outgoing call or transmission to/from a unit in the field. IRR may be provided by the Logging Service, or another system. It typically employs predetermined filters to limit the number of call records that must be searched for a given period of time, and to limit the recordings that a user is authorized to access. | N |
| <i>Local Administrator</i> | A person(s) at the local PSAP who has the authority to manage the local PSAP HMI interface including but not necessarily limited to assigning of user logins & passwords, determining user & system access rights, and determining HMI configurations. | N |
| <i>Single Action Option</i> | A means by which a specific task or function within the HMI can be completed requiring no more than one action on the part of a call taker. | N |

3 Call Taker HMI Requirements

Many HMI requirements shall be configurable by the Local Administrator and allow for display of any/or all Additional Data provided to the system.

3.1 Additional Data/Call History

- A. The display of additional calling device data shall be configurable by the Local Administrator.
- B. Access to Additional Data will remain available throughout the duration of the call.
- C. The HMI shall support drill-down access of Additional Data to obtain additional detail according to access rights.
- D. The HMI shall provide the ability to display the results of external database queries.
- E. The HMI shall provide the call taker the capability to read call records.
- F. The HMI shall make previous call history available to call taker based on the calling party number when available, and shall allow the call taker to access the associated data of call history.
- G. The HMI shall provide an audio and/or visual indicator when call history or Additional Data is available.
- H. The HMI shall provide a pre-populated discrepancy report with a single action option.
- I. The HMI shall provide for the capability for the call taker and Local Administrator to correct calling device location information. A record of the calling device location in the original data shall be maintained.

3.2 Incident Information

- A. The HMI shall provide a single action option for the call taker to automatically populate the calling device location into an incident location field within the call handling or dispatch functional element.
- B. The HMI shall have the capability to filter call records.
- C. The HMI shall provide the ability for the call taker to manually enter an incident location using an address, intersection, latitude/longitude, or commonplace.
- D. The HMI shall provide the capability for the call taker to initiate automatic rebids for an active call via a single action option.
- E. The HMI shall provide the capability for a call taker to manually rebid for a location update.
- F. The HMI shall display the recommended emergency service provider(s) agencies associated with the incident location.
- G. The HMI shall be capable of displaying the recommended emergency service provider(s) associated with the calling device location if the emergency location is not available.
- H. The HMI shall be capable of displaying the communication capabilities of the recommended responder agencies.
- I. The HMI shall be capable of displaying the call handling procedures to a call taker based upon call media type, policy rules, and incident type. This feature shall be configurable by the Local Administrator.

- J. The HMI shall provide the capability for a call taker to select, or for the system to automatically display, pre-arrival instruction based on the nature of the emergency.

3.3 Call Controls and Display

- A. The HMI shall provide programmable buttons to allow for single action access to frequently used features and commands.
- B. The HMI shall provide an audible and visual indicator when a call has arrived. Configurable by Local Administrator.
- C. The HMI shall provide the capability to present a call and allow the agent to process the call.
- D. The HMI shall provide the capability for another person to monitor or join a call as configured by the Local Administrator.
- E. The HMI shall provide a visual and/or audible indication that a call remains unanswered after a configurable amount of seconds.
- F. The HMI shall provide the capability to terminate a call with a single action option.
- G. The HMI shall provide the capability to place a call on “two-way mute”.
- H. The HMI shall provide the capability to take a call off “two-way mute”.
- I. The HMI shall provide the capability to park a call.
- J. The HMI shall provide the capability to un-”park” a call.
- K. The HMI shall display the time a call is placed on “two-way mute” and/or “parked”
- L. The HMI shall provide a visual and/or audible indication after a configurable amount of seconds for a “time on two-way mute” and/or “time in park” call.
- M. The HMI shall provide the capability to transfer a call.
- N. The HMI shall provide the capability to transfer all call record information with a single action option.
- O. The HMI shall provide the capability to establish a conferencing call path.
- P. The HMI shall provide the capability to establish a call path between a call taker and a communications device if a call is abandoned before a call taker can answer the call via a single action option.
- Q. The HMI shall provide the capability to reestablish a call path to a communications device via a single action option.
- R. The HMI shall display the supported call back communications methods to the call taker.
- S. The HMI shall permit the call taker to select from the supported communications methods when initiating a call back.
- T. The HMI shall provide the capability to dial, transfer and/or conference stored telecommunications device numbers.
- U. The HMI shall be capable of displaying the time elapsed for any individual call in the queue.
- V. The HMI shall provide the capability for a call taker to select a pending call from a call queue as configured and permitted by the Local Administrator.

- W. The HMI shall display call queues by logical group (ACD functionality) and providing indication of the number and type of calls in queue as configured by the Local Administrator.
- X. The HMI shall provide line status indication, to include at a minimum: ringing, on “two-way mute”, “park”, idle. This shall be configurable by the Local Administrator to display only those conditions applicable to the PSAP.
- Y. The HMI shall provide the capability for a call taker to take themselves out of queue.
- Z. The HMI shall permit the call taker to indicate a status of "Not Ready" for the situation where the user is signed-on but not available to answer queue calls.
- AA. The HMI shall provide for call taker controlled audio volume adjustment.
- BB. The HMI shall provide the capability for a hook flash or equivalent for the call taker.
- CC. The HMI system shall provide a visual indication to the call taker identifying the PSAP from which an overflow or default routed call originated.
- DD. The HMI shall provide a visual indication to select displays at both the originating and destination PSAPs that calls are being alternate routed due to an overload condition.
- EE. The HMI shall provide the capability for a call taker to initiate a call (contact) from within an Additional Data field. I.e. when a call taker places the mouse pointer over a phone number, e-mail address, etc.
- FF. The HMI shall provide the capability to store, search and sort communications device numbers contact in categorized lists, buttons, and/or tabs.

3.4 Instant Recall Recording

- A. The HMI shall provide the capability to display instant recall recordings for immediate playback of calls with a minimal number of actions as configured by the Local Administrator.
- B. The HMI shall provide the capability to retrieve the instant recall recording based upon search criteria as configured by the Local Administrator.
- C. The HMI shall provide the capability to display a list of available instant recall recordings.
- D. The HMI shall provide the capability to play, pause, rewind and fast forward instant recall recordings.
- E. The HMI shall provide the capability to display references to Additional Data associated with a call when accessing that call through the instant recall recorder.

3.5 Multimedia Display

- A. The HMI shall provide the capability to automatically launch the appropriate multimedia module for the call type.
- B. The HMI shall provide the flexibility to determine screen launch location as configured by the Local Administrator.
- C. The HMI shall provide the capability to restrict/minimize the display of incoming video conferencing with a single action option.
- D. The HMI shall provide the capability to block outgoing video conferencing with a single action option.

- E. The HMI shall allow for a call taker to enlarge or decrease the size of the multimedia module(s). The Local Administrator should also have the ability to create single action options to have the multimedia module displayed at preset sizes.
- F. The HMI shall provide the capability to notify the call taker when multimedia attachments become available and allow the call taker to choose to view or not.
- G. The HMI shall provide the capability to establish text messaging internal to the PSAP with a minimal number of actions.
- H. The HMI shall provide the capability for the call taker to handle multiple text calls at the same time.
- I. The HMI shall provide the capability to visually distinguish between parties within the text conference.
- J. The HMI shall have the capability for the call taker to change the display of data within specific modules (font type, size, color etc.) as allowed by the Local Administrator.
- K. The HMI shall provide the call taker with a single action option to put an existing text call into queue status with all call record information attached to the call.
- L. The HMI shall be configurable to allow either automatic or manual activation of a Video Call/Conference with the calling device.

3.6 Map Display

- A. The HMI shall display emergency event location and calling device location information on a map display based upon configuration.
- B. The HMI shall provide the capability to customize the display rules for caller and event location, configurable by the Local Administrator.
- C. The HMI shall provide the capability to display location update results on a map display.
- D. The HMI shall provide the capability to accept or reject the update request results.
- E. The HMI shall provide the capability to draw geometric shapes on the map display.
- F. The HMI shall provide the capability to zoom the map display.
- G. The HMI shall provide the capability to pan the map display.
- H. The HMI shall provide the capability to select/unselect a GIS layer type for display.
- I. The HMI shall provide the capability for the call taker to search for the emergency location using at a minimum: a) geo-coordinates b) civic address.
- J. The HMI shall provide the capability for the call taker to search for the emergency location by clicking on a map display.
- K. The HMI shall display location search results to the call taker.
- L. The HMI shall provide the capability to select an emergency location from the map display.
- M. The HMI shall provide the capability to display the emergency response agencies associated with a caller's location on the map display.
- N. The HMI shall provide the capability to display the emergency response agencies associated with an emergency location on the map display.
- O. The HMI shall provide the capability to graphically display the accuracy/uncertainty associated with a given calculated position.

- P. The HMI shall support the representation of additional location information for a mobile device.

4 Dispatch HMI Requirements

This topic will be addressed in Version 2 of this document.

5 Supervisor HMI Requirements

This topic will be addressed in Version 2 of this document.

6 References

- *USDOT NG9-1-1 HMI Display Design Document, January 2008*
- *NENA58-001v2, NENA NG9-1-1 System and PSAP Operational Features and Capabilities Requirements Standard*
- *NENA 71-001 v1, NENA Standard for NG9-1-1 Additional Data*

7 Previous Acknowledgments

None