NENA Wireless E9-1-1 Overflow, Default and Diverse Routing Operational Standard

NENA
Operational Standard/Model Recommendation

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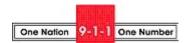
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Acknowledgments:

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1. Executive Overview

The Wireless Overflow, Default and Diverse routing work group was formed to establish recommended operational standards associated with an important element in the deployment of wireless E911 Phase I and Phase II service – system design considerations regarding overflow, default, alternate and diverse routing. The intent of the document is to provide operational guidance and recommendations regarding the identified call routing scenarios as they relate to calls processed between the MSC and SR.

Development of the associated operational recommendations included general review of call routing scenarios currently deployed, options generally available based on MSC switch technologies, impacts to the PSAP and impacts to the 9-1-1 caller.

2. Introduction

2.1 Purpose and Scope

The NENA Wireless Overflow, Default and Diverse routing recommendations document was developed to provide guidance in the routing development associated with wireless Phase I and Phase II deployment efforts. This document provides recommended terminology definitions, describes each call routing scenario, and associated routing recommendations.

2.2 Reason to Implement

Implementation of these recommendations will foster consistent operational standards across wireless E9-1-1 systems. In addition this document establishes definitions for the call routing scenarios to foster a common understanding and use of terms between PSAPs and Wireless Service Providers as the wireless deployment is being planned.

2.3 Benefits

Use of this document will:
- Foster a common understanding of terms used in the deployment of wireless service for the associated call routing scenarios.
- Foster increased communication regarding wireless call routing options in the planning of wireless 9-1-1 deployments
- Foster a common set of standards to be applied to wireless 9-1-1 call routing scenarios • Provide guidance to switch vendors regarding desired operational attributes of MSC's.

2.4 Technical Impacts Summary

Technical impacts are related directly to the network architecture of the MSC, cellular towers and network operations center alarming. The recommendations regarding the treatment of calls in each

routing scenario will be impacted by the capability of the wireless switch to meet the associated recommendation.

2.5 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".

2.6 Reason for Reissue

NENA reserves the right to modify this document. Whenever it is reissued, the reason(s) will be provided in this paragraph.

Document Number	Approval Date	Reason For Issue/Reissue
NENA 57-001	November 18, 2004	Initial Document
NENA 57-001.1	November 18, 2014	Reaffirmation
NENA-STA-054.1.1-2024, formerly 57-001.1	October 1, 2024	Reaffirmation. Minor updates include new document number assignment, addition of Reason for Issue/Reissue table for document tracking purposes, update to webpage link for Glossary in Section 2.9 and table of contents.

2.7 Costs Factors

The Cost Factors section is intended to provide a brief summary of potential system or application cost impacts regarding the subject of this NENA document. If it is not applicable in any given document, simply enter "Not Applicable " in this section.

This document provides recommended standards regarding call routing associated with various scenarios.   Compliance with the recommended standards will be dependent upon the associated wireless switch, wireless tower and selective router capabilities. Cost factors will be associated with these system components to the degrees that switch upgrades or changes are required. Cost factors associated with route diversity and system diversity recommendations will have potential impact to the wireless service provider, local 9-1-1 service provider and the PSAP – to the degree that the recommendations are fully deployed.

2.8 Cost Recovery Considerations

Cost recovery will be dependent upon legislative and regulatory cost recovery mechanisms for wireless deployment in each state**.**

2.9 Acronyms/Abbreviations

See NENA-ADM-000, NENA Master Glossary of 9-1-1 Terminology, located on the NENA web
site for a complete listing of terms used in NENA documents. All acronyms used in this document
are listed below, along with any new or updated terms and definitions.

The following Acronyms are used in this document:	
ALI	Automatic Location Identification
ANI	Automatic Number Identification
ESRK	Emergency Services Routing Key
MSC	Mobile Switching Center
NOC	Network Operations Center
pANI	Pseudo-ANI
PSAP	Public Safety Answering Point
SR	Selective Router

The following *new terms* are included in this recommendation:

Fast Busy Tone: Also, Reorder Tone. An audible tone of 120 interrupts per minute (IPM) returned
to the calling party to indicate the call cannot be processed through the network.

MSC Trunk Overflow: the routing condition that occurs when all trunks from the MSC to the SR
are busy with calls and additional calls need to be routed to the PSAP. Wireless call volume exceeds
available MSC to SR trunk capacity.

MSC Trunk Alternate Route: the routing condition that occurs when all trunks from the MSC to
SR are *out of service* and calls need to be routed to the PSAP.   The scenario represents an MSC to
SR trunk *failure* condition versus an all trunks *busy* condition.

MSC Default Route: the routing condition that occurs when a) a wireless 9-1-1 call arrives at an
MSC with insufficient data to allow normal routing to the correct PSAP, or b) all dedicated MSC to
SR trunks, primary and secondary routes, are out of service (ie. trunk *failure* condition). **Serving
PSAP**: the PSAP to which calls would normally be routed.

3 Operational Description

3.1 Operational Standards Development Premise

The wireless overflow, default, alternate and diverse routing operational standards recommendations
are centered on the following premises:

- Overflow, alternate, default and diverse routing should be reviewed with the WSP during the
  planning and implementation of wireless E911 service.

- Wireless 9-1-1 calls should be routed within the 9-1-1 network infrastructure.

- Wireless 9-1-1 calls should be routed via dedicated 9-1-1 call paths.

- Wireless 9-1-1 calls should not be routed to ten digit administrative numbers.

- Wireless 9-1-1 calls routed to other than the serving PSAP should be done on a pre-planned basis using appropriate communications infrastructure, SOP's, mapping and associated resources. Appropriate agreements with the serving PSAP must be in place to ensure proper notification, routing, data integrity and call handling.

3.2 Call Routing Scenarios Defined

The following provides Operational recommended standards associated with the MSC to S/R call path and the following call routing scenarios:

  • **MSC – SR Overflow Routing**

   Description : MSC/SR overflow routing occurs when all trunks are "traffic busy".

  • **MSC Trunk Alternate Routing**

   Description: Calls requiring alternate routing due to an "out of service" condition where extended timeframes may be required for call path availability.

  • **MSC Default Route**

   Description: Call routing required due to insufficient call data received by the MSC and/or

S/R to route the call to the proper serving PSAP

  • **Route Diversity**

   Description: the practice of routing circuits along different physical paths in order to prevent total loss of 9-1-1 service in the event of a facility failure.

3.3 MSC- SR Overflow routing: Operational Standard Recommendation

MSC-SR overflow routing shall be to either a) "fast busy tone" or b) to an appropriate MSC recorded announcement advising the caller that the call cannot be completed (where option a) is not available due to MSC switch architecture limitations).

It is a desired switch feature to be able to differentiate between a "traffic busy" condition versus an "out of service" condition as noted in the MSC alternate routing recommendations.

3.4   MSC Trunk Alternate Route: Operational Standard Recommendation

MSC Trunk Alternate routing shall be to a) "fast busy" or, where this capability is not available, b) route to appropriate recorded announcement advising that the call cannot be completed.
It is desired that the switch translations (based on alarm conditions sent to the NOC) be invoked to route the calls to a secondary pre-designated PSAP over existing MSC / SR trunks. The process

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must be pre-planned to ensure appropriate router/router data handling, ESRK/pANI rebid capability, communications networking (voice and data) and related SOP's are in place between the PSAPs. Notification to the affected PSAP(s) should be made, by the WSP, within (15) minutes of the alarm threshold notification.

Where this capability is not available, the call may be routed to a pre-designated, dedicated 10-digit number in the serving PSAP. This number should be in the PSAP, manned 7x24x365 and identifiable to the call taker with a priority equivalent to a 9-1-1 call. *Administrative numbers shall not be used for this purpose.*

It is a desired feature that a trunks "out of service" condition be able to be differentiated, via alarm thresholds, from trunks that are traffic busy at the MSC.

3.5   MSC Default Route: Operational Standard Recommendation

MSC default routing, based on cell tower location, to the proper serving PSAP is a desired feature. Where MSC capabilities exist, default calls should be routed based on the location of the cell tower / MSC, to the MSC-SR trunks designated for that cell site to the serving PSAP.

Switch level defaulted calls, where insufficient call data is received to identify and initiate routing to the proper serving PSAP, shall be routed to a "fast busy" tone or, where that option is not available, to an appropriate recorded announcement.

3.6   Route Diversity: Operational Standard Recommendation

Call path facilities shall be diverse and redundant between the MSC/ SR and the S/R – PSAP to avert single points of failure. Diversity and redundancy within associated 9-1-1 components in the network and at the PSAP is a desired feature to avert single points of failure.

3.7   Emerging Technologies / Other Alternatives

The Wireless Operations Routing Working group will evaluate emerging technologies and other alternatives at the MSC /SR level as they become available. Future recommendations will be made as appropriate.

4.   References

Future

5.   Exhibits

Future

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