NENA Standard for E9-1-1 Functional Entity Model

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Acknowledgments:

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1 Executive Overview

Recent changes in telephony technology along with corresponding changes in the regulatory environment with respect to E9-1-1 Service are impacting the service architectures being defined for E9-1-1 Services. Support of Wireless Phase II and NENA i2 for VoIP are making enhancements to existing E9-1-1 functionality necessary. The definition of service architectures to support Wireless Phase II and NENA i2 for VoIP functionality will impact both wireless and wireline networks. Since both wireless and wireline networks will play a role in processing an increasing number of Emergency Calls, it is critical that the interconnection for these networks be based on a common understanding of the functions and interfaces supported by each network. A clear definition of E9-1-1 Service at a functional level is needed to facilitate the definition of meaningful and consistent standards which support existing and enhanced E9-1-1 Service functionality and to facilitate network interconnection for the purpose of processing Emergency Calls.

This document contains a set of Functional Entities (FEs) that address a portion of the Functional Entity Model for E9-1-1 Services. The FEs defined in this document addresses the functionality applied by a wireline network and a PSAP to an incoming Emergency Call. These FEs are applicable to Emergency Calls originating from variety of networks including wireline networks, wireless networks under Phase 1 and Phase II, and Voice over Internet Protocol (VoIP) networks. It is expected that the Functional Entity Model will be refined and updated as new functions, technologies and architectures with respect to E9-1-1 Service evolve. This document is intended to provide input to the PTSC Committee and the TR45-2 Committee on Emergency Services to assist them in the definition of standards that support existing and enhanced E9-1-1 functionality in a consistent manner**.**

2 Introduction

2.1 Operational Impacts Summary

Not Applicable.

2.2 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".

2.3 Reason for Issue/Reissue

This document is intended to clearly describe the Functional Entities that cooperate to provide E9-1-1 service. This document is intended to provide input to the PTSC Committee and the TR45.2 Committee on Emergency Services to assist them in the definition of standards that support existing and enhanced E9-1-1 functionality in a consistent manner

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

Version	Date	Reason For Changes
Original	06/2000	Initial Document
2	01/19/2008	This document has been reissued as Issue 2 to describe new Functional Entities that have been introduced to support E9-1-1 for NENA VoIP i2 solution.

2.4 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.

2.5 Anticipated Timeline

Not Applicable.

2.6 Costs Factors

Not Applicable.

2.7 Cost Recovery Considerations

Not Applicable.

2.8 Acronyms/Abbreviations/Definitions

This is not a glossary! See 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:	
Acronym	***Description***
ANSI	American National Standards Institute
ESME	Emergency Service Message Entity
FE	Functional Entity
GR-2945	Telcordia Year 2000: Systems and Interfaces General Requirements Document
i2	NENA 08-001 Interim VoIP Architecture for Enhanced 9-1-1 Services (i2)
PTSC	Packet Technology and Services Committee (ATIS Standards Committee)

The following Acronyms are used in this document:	
TR45	TIA Engineering Committee on Mobile and Personal Communications Standards

2.9 Intellectual Property Rights Policy

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3 Emergency Services Functional Entities

3.1 Functional Entity Model

Functional Entity (FE-1) – Detection
The Detection functional Entity (FE-1) determines if Emergency Services processing should be applied to a call based on signaled information and/or the incoming trunk group associated with an emergency call.

Functional Entity (FE-2) – E9-1-1 Call Processing
The E9-1-1 Call Processing functional Entity (FE-2) establishes call identification (e.g., ANI, pANI) for delivery to the PSAP (FE-6).

Functional Entity (FE-3) –Selective Routing Information Determination
The Selective Routing Information Determination functional entity (FE-3) is invoked by the E9-1-1 Call Processing functional entity (FE-2). The received call identification along with Emergency Service Number (ESN) information is used for routing the emergency call to the appropriate PSAP (FE-6).

Functional Entity (FE-4) – Default Routing
The Default Routing functional entity (FE-4) will route the emergency call to a predefined PSAP (FE-6) under conditions of call identification failure, or unavailability of the Selective Routing Information Determination (FE-3).

Functional Entity (FE-5) – Alternate Routing
The Alternate Routing functional entity (FE-5) when invoked routes the emergency call to an alternate PSAP (FE-6) if the call cannot be completed to the intended PSAP.

Functional Entity (FE-6) – PSAP
The PSAP functional entity (FE-6) is the delivery point for an emergency call when invoked by E9-1-1 Call processing (FE-2)

Functional Entity (FE-7) – Call Transfer
The Call Transfer functional entity (FE-7) when invoked by the PSAP (FE-6) will determine the location to which the call should be transferred.

Functional Entity (FE-8) – Call Back
The Call Back functional entity (FE-8) when invoked by a PSAP (FE-6) will use the call back number received to initiate a call to the **originating party.**

Functional Entity (FE-9) – Receipt of Call Location Information
The Receipt of Call Location Information functional entity (FE-9) (e.g., MPC, VPC) is capable of receiving call information (e.g., caller location, caller identification, subscriber information) from the

originating network.

Functional Entity (FE-10) – Storage of Permanent and Transient Call Information
The Storage of Permanent and Transient call information functional entity (FE-10) (e.g., ESME) will maintain and store/buffer call information received from Receipt of Call Location Information (FE - 9) and associate it with other stored call information.

Functional Entity (FE-11) –Call Information Query
The Call Information Query functional entity (FE-11) (e.g., ALI Query) when invoked by the PSAP (FE-6) is capable of requesting call information from Storage of Permanent and Transient Call information (FE-10). This information may include caller location information, call back number, and/or subscriber specific information.

Functional Entity (FE-12) – Call Hold
The Call Hold functional entity (FE-12) when invoked will hold or maintain as a call, the connection associated with an Emergency Call between the caller and the PSAP (FE-6) even if the caller attempts to disconnect or hang up. This functionality is available within some wireline networks and not typically available in wireless and VoIP networks. This functional entity is necessary to support the invocation of Ring Back (FE 13) by the PSAP (FE-6).

Functional Entity (FE-13) – Ring Back
The Ring Back functional entity (FE-13) when invoked by the PSAP (FE-6) in conjunction with Call Hold (FE-12) will result in the initiation of a ringing condition to the calling party that originated the emergency call. This functional entity is available within some wireline networks and not typically available in wireless and VoIP networks. The Ring Back functional Entity (FE-13) should not be confused with Call Back functional entity (FE-8).

Functional Entity FE-14) – Route Determination
The Route Determination functional entity (FE-14) (e.g., ERDB) will determine the appropriate routing for call delivery by querying a routing database using either civic or geodetic information.

Functional Entity (FE-15) – Address Validation
The Address Validation functional entity (FE-15) (e.g., VDB) performs the steps necessary to ensure an address correlates to a MSAG valid address.

Functional Entity (FE-16) – Location Information Server
The Location Information Server functional entity (FE-16) is a repository for the location information that is used to develop a wire map.

Functional Entity (FE-17) – Media Gateway
The Media Gateway functional entity (FE-17) (e.g., ESGW) performs the steps necessary to interconnect a IP network with a legacy E9-1-1 network or PSAP

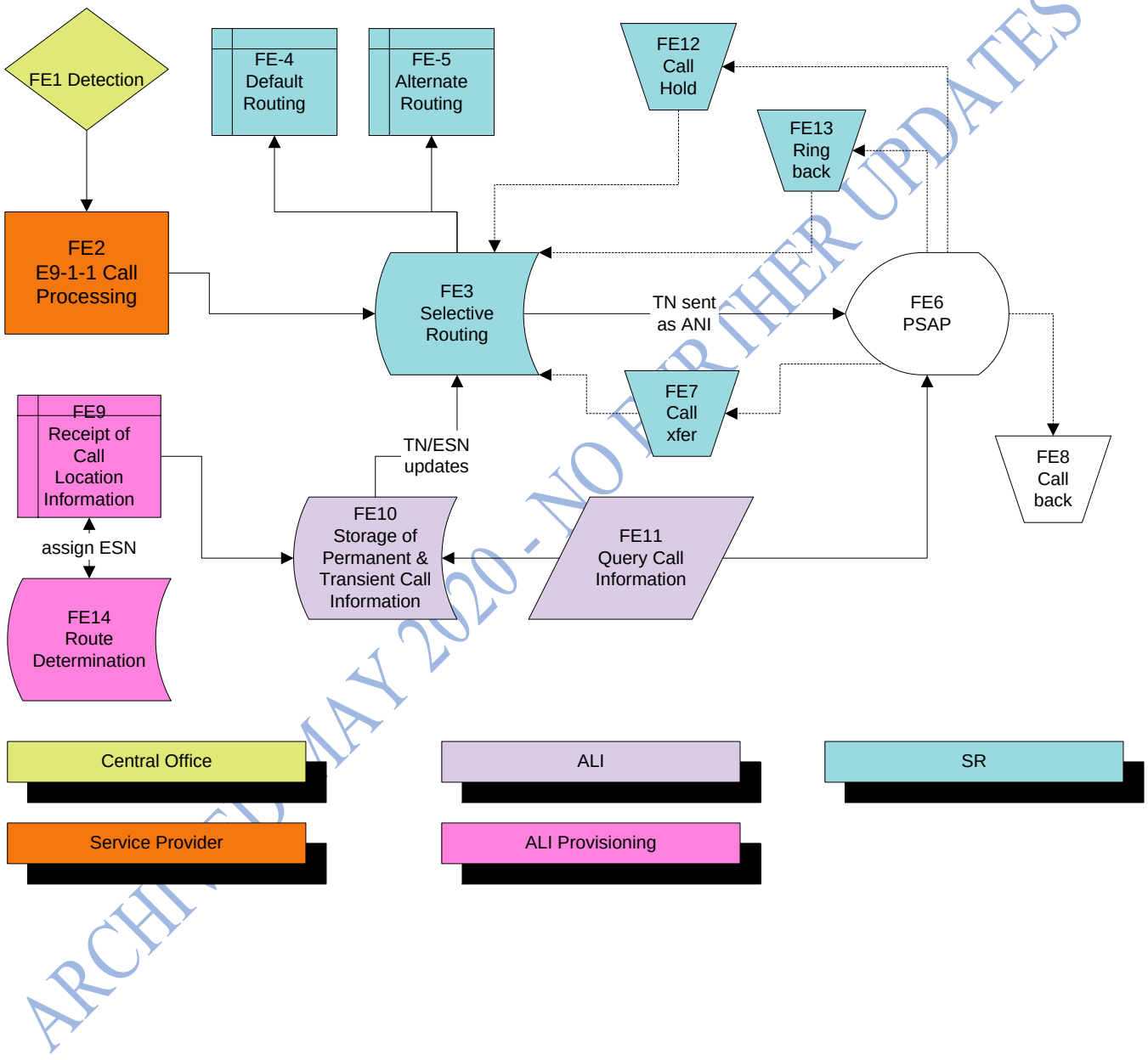
Functional Entity (FE-18) – Caller Location Determination
The Caller Location Determination functional entity (FE-18) (e.g., PDE) performs the steps necessary to identify the caller's location.

3.2 Functional Entity Associations

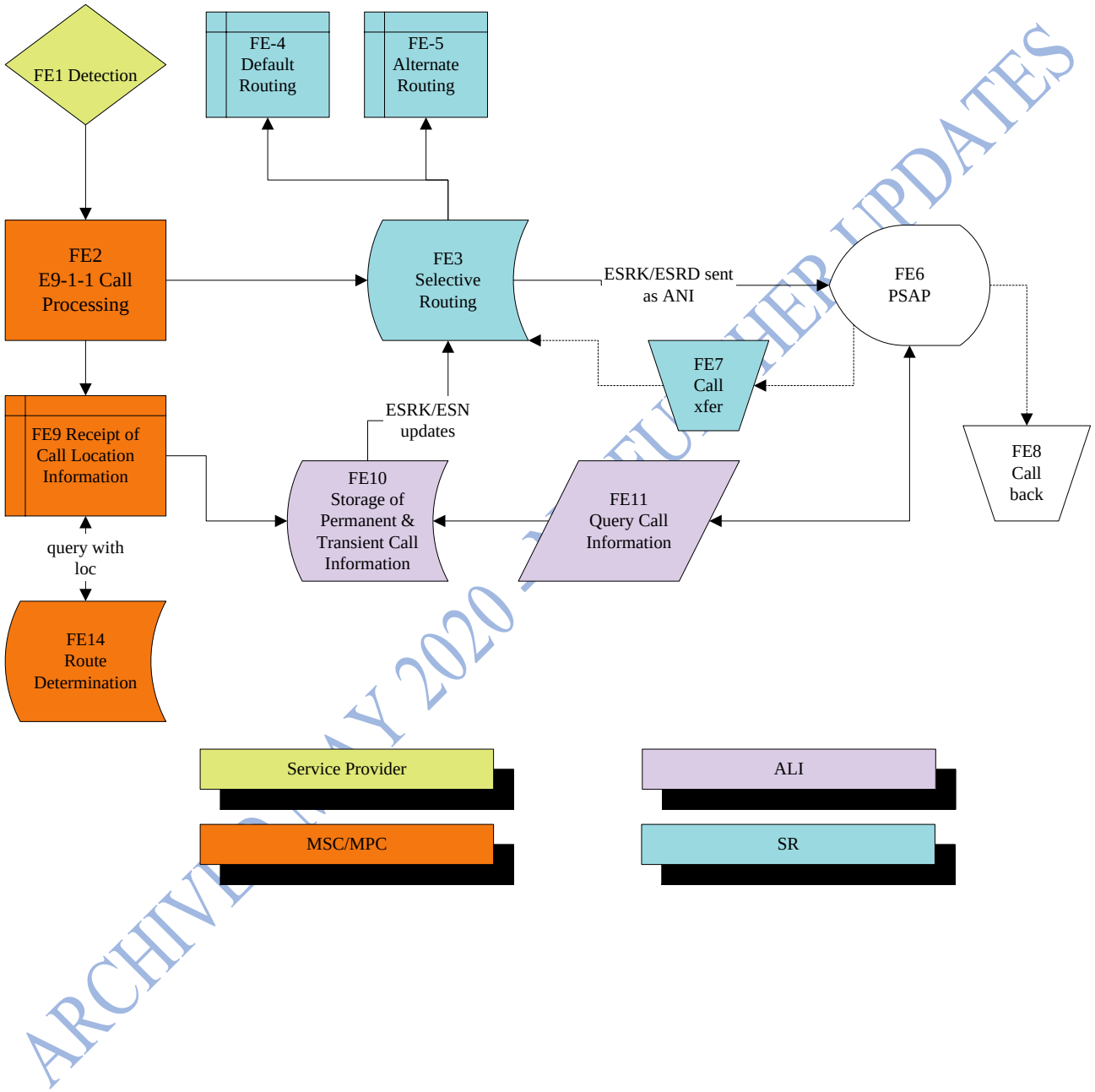
Functional Entity #	Functional Entity Type	Wireline	Wireless	VoIP i2
FE-1	Detection	Yes	Yes	Yes
FE-2	E9-1-1 Call Processing	Yes	Yes	Yes
FE-3	Selective Routing Determination (SRDB)	Yes	Yes	Yes
FE-4	Default Routing	Yes	Yes	Yes
FE-5	Alternate Routing	Yes	Yes	Yes
FE-6	PSAP	Yes	Yes	Yes
FE-7	Call Transfer	Yes	Yes	Yes
FE-8	Call Back	Yes	Yes	Yes
FE-9	Receipt of Call Information	Yes Static – provisioning process	Yes Dynamic – MPC	Yes Dynamic – VPC
FE-10	Storage of Permanent and Transient Call Information	Yes	Yes	Yes
FE-11	Call Information Query	Yes	Yes	Yes
FE-12	Call Hold	Sometimes	No	No
FE-13	Ring Back	Sometimes	No	No
FE-14	Route Determination	Yes Static – provisioning process	Yes Dynamic – MPC	Yes Dynamic – VPC/ERDB
FE-15	Address Validation	Yes	No	Yes
FE-16	Location Information Server	No	No	Yes
FE-17	Media Gateway	No	No	Yes
FE-18	Caller Location Determination	No	Yes	Yes

3.3 Functional Entity Relationship Diagrams

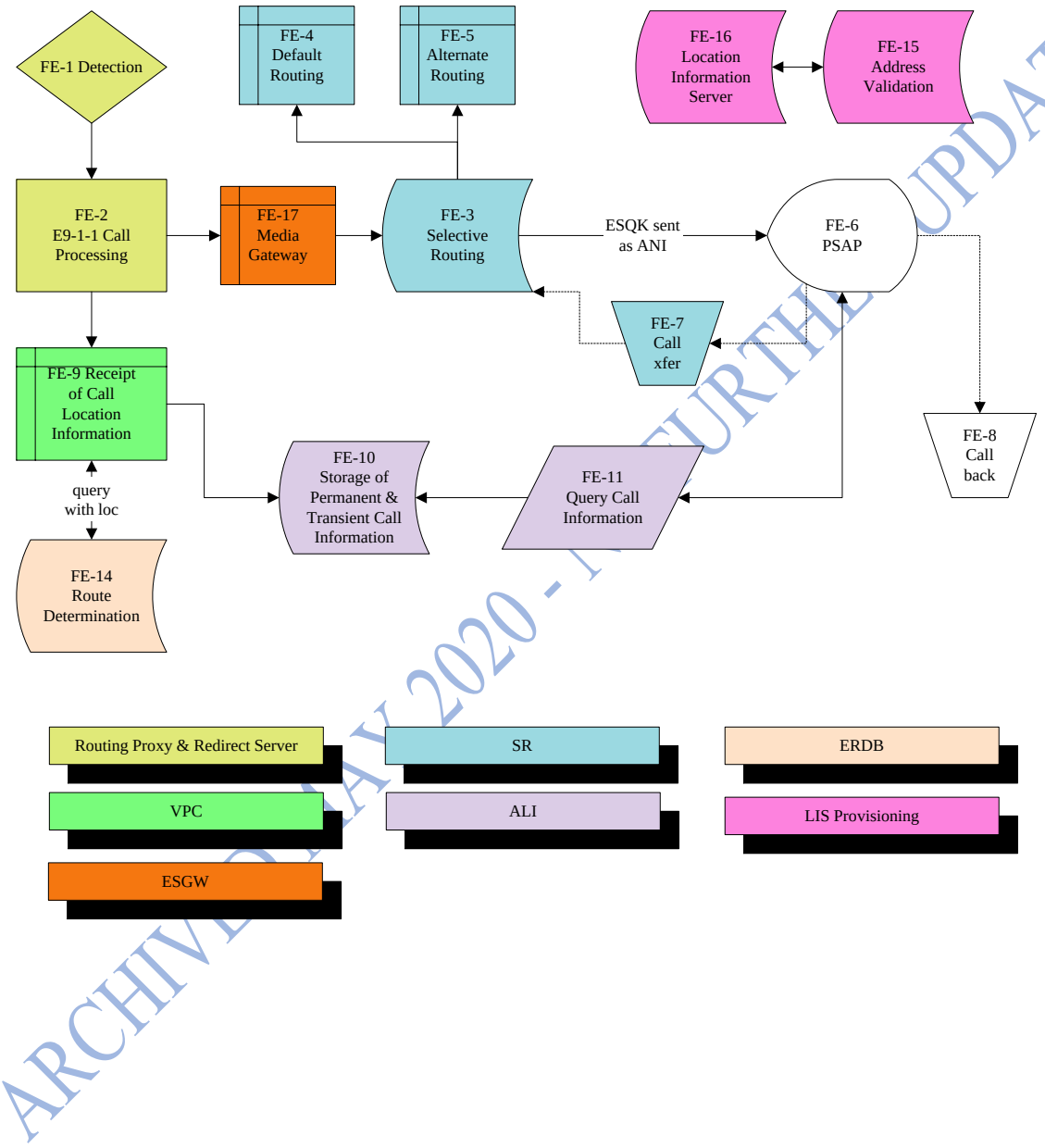
Wireline Entity Relationship Diagram



Wireless Entity Relationship Diagram



VOIP I2 Entity Relationship Diagram



4 References

NENA 08-001 Interim VoIP Architecture for Enhanced 9-1-1 services (i2)

GR-3119 Telcordia General Requirements Document for ERDB

GR-3130 Telcordia General Requirements Document for VDB