Emergency Services Interconnection Forum (ESIF)

Emergency Services Messaging Interface Task Force ('Task Force 34')

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Abstract:

In response to chair's call for clarification of stage 1 text to reflect common, connection oriented and web services language. The following text is derived from ESMI-003-R8 normative (i.e. all R8 changes are accepted prior to editing). Some changes tracked in this document are manual additions derived from ESMI-034 (Shepard, HBF) and ESMI-036 (Sines, HBF). Other changes are original in this document (Dupras, Intrado). Comments are included to clarify where needed, but such comments are informative only.

Recommendation:

It is proposed that ESMI-003 Stage 1 be amended to reflect the changes tracked in this document.

Stage 1 – Emergency Services Messaging Interface Requirements

Figure 7-1~~Figure 6-1~~ represents the network reference model for this specification. Interface A1 (Emergency Services Messaging Interface) is the only interface defined in this standard. The other interfaces (those with dashed lines) are presented for clarification of the discussion.

Network Reference Model

Functional Entities

CESE Conforming Emergency Services Entity

RG Reponse Gateway

ESNE Emergency Services Network Entity (a network element of TIA/EIA/J-STD-036-A) illustrates a specific case of the *Emergency Request Sources* logical entity

ESME Emergency Services Message Entity (a network element of TIA/EIA/J-STD-036-A) illustrates a specific case of the *Emergency Information Sources* logical entity

Interfaces

A1 Emergency Services Messaging Interface

Remarks

(1) The interfaces depicted as dotted lines linking entities are beyond the scope of this standard or are defined elsewhere

(2) The (1:n) notation means "one or more" instances

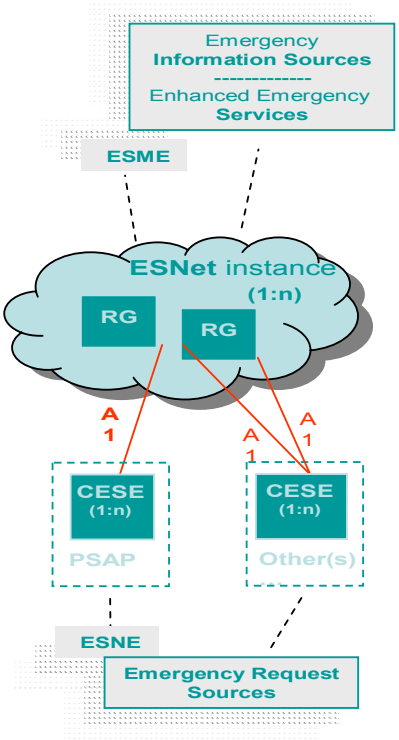

Figure 7~~6~~-1 Network Reference Model – Logical Entities

- Conforming Emergency Services Entity (CESE)
  - CONNECTION ORIENTED: In a connection oriented model, the client side of the Emergency Services Messaging Interface.
  - It is thought of as residing on the premises of an agency such as a PSAP or participating organization. The design of a CESE is beyond the scope of this specification.
- Response Gateway (RG)
  - CONNECTION ORIENTED: In a connection oriented model, the server side of the Emergency Services Messaging Interface.
  - The RG does not host ESNet services itself, but provides a message gateway function and acts as an abstraction and point of concentration for messages and services that may originate elsewhere within or behind the ESNet. For example, the RG may provide interworking to an ALI database to retrieve ALI. The design of the RG and "back net" functions is beyond the scope of this specification.
- Emergency Services Network Entity (ESNE)
  - A network element defined in TIA/EIA/J-STD-036-A
  - The ESNE routes and processes the voice band portion of the emergency call. This is composed of selective routers (also known as Routing, Bridging and Transfer switches). The structure of the Emergency Services Network is beyond the scope of this standard.
- Emergency Services Message Entity (ESME)
  - A network element defined in TIA/EIA/J-STD-036-A
  - The ESME routes and processes the out-of-band messages related to emergency calls. This may be incorporated into selective routers (also known as Routing, Bridging and Transfer switches) and Automatic Location Information (ALI) database engines. The structure of the Emergency Services Network is beyond the scope of this standard.

6.1 Example Scenarios

The following scenarios illustrate the use of the Emergency Services Messaging Interface. They are not intended to be an all inclusive set of services and functionalities.

6.1.1 CESE Registration/Authentication

The CESE will authenticate as needed prior to utilizing services. Additional authentication may be required based on the specific services being invoked.

CONNECTION ORIENTED: The CESE must register and initialize with the ESNet. This occurs either the first time the CESE connects to the RG or on a re-initialization after a complete communication failure.

CONNECTION ORIENTED: The CESE sends a connection initialization message to the RG. This initialization message contains, but is not limited to, the CESE entity identifier, authorization credentials and message set version number. Once the CESE is authenticated, a communication channel is established between the CESE and the RG. The message exchange sequence between the CESE and RG is to be specified in the Stage 2 and Stage 3 sections of this document.

6.1.2 CESE Initiated Services

Once, initialized the CESE may request services from the ESNet. The CESE may also initiate and manages services through the RG.

6.1.2.1 Emergency Event

An Emergency Event is one example of a CESE initiated service. An Emergency Event is defined as an emergency request being received by the CESE, querying for event information and terminating the request after handling has been completed. Emergency Event scenarios describe the various types of emergency call handling events (wireline, wireless, etc.) in the ESNet context.

Referring to Figure 7-1~~Figure 6-1~~, a 9-1-1 call comes into the ESNE and routes to the PSAP and the CESE. The incoming call typically includes both voice and ANI. Once the CESE receives the call it makes an Emergency Event - New to the RG across interface A1 (the ESMI). The RG, in cooperation with other elements in the ESNet, retrieves information to be returned to the CESE. For example the RG may obtain ALI information from the ALI database. Or it might interrogate other networks (e.g. an MPC in a wireless network or other Emergency Information Sources). As the RG has obtains information it sends the information to the CESE across interface A1.

Information for an Emergency Event may be segmented where some information is available immediately, other information is delayed for a small period of time, and yet additional information becomes available later during the emergency event. Therefore, it is useful for the Emergency Services Messaging Interface to support multiple responses to a single CESE Emergency Event request. For example with Wireless Phase 2 data, the ESNet could make the Shell ALI record available immediately and provide the latitude and longitude at a later (perhaps several seconds) time.

Queries for various types of emergency calls (e.g. wireline vs. wireless) require different response times. Therefore, the Emergency Services Messaging Interface must support the overlapping of queries and responses for multiple events. For example, responses from a wireless Phase 2 query may take longer to respond than queries for wireline information.

The ESMI must create context for a given Emergency Event. The ESNet assigns an Emergency Event Identifier (EEID) that will be unique to this Emergency Event across the ESNet and will be delivered in all messages from the ESNet (via the RG) to the CESE for the given emergency event.

As mentioned an Emergency Event is bracketed by the origination of an emergency request and the termination of the emergency event. The CESE notifies the RG via an ESMI message when the emergency event is complete. The Emergency Event Complete message signifies to the RG and ESNet that no additional information is to be sent to the CESE regarding this event and related services for this event with respect to this particular CESE are to be completed.

6.1.2.2 CESE Event Transfer

Emergency events are sometimes transferred from one CESE to another. The CESE may notify the RG and/or an Emergency Information Service of a transfer and any local notes entered by the Call Taker from the originating CESE may be stored within the ESNet for future access when the transferred to CESE queries for information.

6.1.2.3 CESE Information Discrepancy Initiation

An information discrepancy occurs when what is displayed at the CESE is different than what is learned from the caller. This capability allows a CESE to immediately create an information (e.g., ALI) discrepancy report and forward that report to an entity that will initiate corrective actions. This transactional primitive within the ESNet allows the PSAP CPE vendors to implement an information discrepancy report with a simple operation. Similar concepts may handle misroute instances and other information inconsistencies.

6.1.3 ESNet Initiated Services

Authorized agencies on the ESNet may initiate some services via the RG to the CESE. These services may be directed to a single CESE, a group of registered CESEs or all CESEs depending upon the service.

6.1.3.1 Notification Messages to CESE

Authorized agencies may send unsolicited notification messages to one or more CESEs or end users. The agency may provide an enhanced service, national emergency service or some other notification services. The authorized agencies may obtain a list of currently registered users from a CESE and target its messages to an individual user, all users or a group of (administered) users. The message may contain text and/or binary data (e.g., pictures, videos).

6.1.4 Reports and Status

Because the CESE and RG both play an important role in managing and handling emergency events it is useful for the Emergency Services Messaging Interface to support capabilities that allow one entity to interrogate the other regarding status information. Such information may play a role in troubleshooting problems or providing reports and statistical information.

6.1.4.1 CESE Event Status

The Emergency Services Messaging Interface allows the RG to query emergency event status information from a given CESE. This allows the ESNet to properly coordinate applications that depend on event processing status and to manage ESNet resources that are allocated on a per event basis. Event monitoring allows the RG to query a CESE and request current event activity at the given CESE. The provider may then reconcile active events status within the ESNet.

6.1.4.2 ESNet Event Status

The Emergency Services Messaging Interface should allow the CESE to query event status information from a RG. This allows the CESE to obtain pertinent data that resides within the ESNet.

6.1.4.3 CESE Metrics Reporting (Editor's Note: This section is not baselined.)

The ESNet may provide a metrics collection service and corresponding reporting service to allow oversight on specific CESE transactions and activities that occur between CESE entities. This capability will allow a given CESE to forward activity and volume metrics to an overall report and metrics tracking service within the ESNet.

6.1.5 Managing and Monitoring the Emergency Services Messaging Interface

The interface between CESE and ESNet is monitored for availability at both the physical and application level protocol. This allows the CESE and RG to report communication failures including the inability for either entity to properly communicate and respond to application level messages.

6.1.5.1 Communications Integrity

The integrity of the communications between the CESE and RG must be maintained at all levels of the protocol. At the application level this may be through communications checks such as keep alive messages or other such mechanisms.

6.1.5.2 Component Management

The communicating nodes (CESE and RG) must be able to go out of service and return to service in a graceful manner. CONNECTION ORIENTED: Therefore, in a connection oriented model, if a node is going to go out of service it should notify each node with which it is communicating. If it is the RG that is going out of service then the CESE should reestablish communications to another RG as discussed in Section 6.1.1

6.1.5.3 CONNECTION ORIENTED: Exercising Component Connections

It is a good practice for communicating nodes to exercise the routes between them periodically. This allows early detection of problems, e.g. transport service provider being down. The system should allow automatic transfer of connections. This shall be done in a graceful manner without adversely affecting service.[BD1] ~~Long-lived TCP connections become "stale". When they become "stale", it is usually not noticed by either communicating party until someone is trying to send a message. At that time, the client could react by attempting to reconnect, but there is a loss of efficiency, since the client was busy trying to send the message out in the first place. Now it is forced to wait until the connection is re-established. Meanwhile there could be new messages that the client would somehow need to buffer. To sum up, it is recommended to roll connections in a controlled fashion. Therefore, the CESE should periodically rotate their connection to a new connection and disconnect the old session. This is termed acquiescence.~~ Proactively exercising all available routes between the nodes over time reduces the likelihood such problems will wait to be detected at the time the communication is most needed (i.e. at the time of an emergency event).

6.2 High Level Requirements

6.2.1 CESE to ESNet Network Requirements

ESMI.Network.0100-0100 The Emergency Services Messaging Interface (ESMI) shall support TCP/IP network interfaces between CESEs and RGs.

Rationale: TCP/IP supports a large collection of readily available techniques and technologies for implementing the ESMI and additional layered on features and applications. It is assumed that this interface will require a minimum transport layer speed and is not supported over existing legacy asynchronous 1200/9600 bps links. More advanced transport speeds are expected to be required as additional information sources, services, and interaction models are introduced to the PSAP or other CESE entity. The number of call taker positions supported per ALI retrieval submittal rate and ALI response model (wireless can lead to multiple responses) will ultimately lead to situational dependent engineering analysis of required transport bandwidth. Physical links should be engineered for acceptable transport latency for each expected application scenario being implemented with the ESMI (e.g., ALI delivery).

ESMI.Network.0200-0100 The CESE shall be capable of initiating transactions and responding to externally generated requests~~designated as the TCP/IP client and the RG shall be the TCP/IP server~~.

Rationale: ~~It is the responsibility of the CESE to initiate the connection to the RG at the transport level.~~ At the application level the CESE and the RG operate as peers since messages are initiated from either one.

ESMI.Network.0300-0100 The ESMI shall allow use of redundant physical transport routes.

Rationale: The network should be designed with redundant facilities to assure that there is no single point of failure. The network interface between the PSAP and the RG must be designed to withstand multiple failures by incorporating redundant physical routes to ensure reliability.

ESMI.Network.0400-0100 CONNECTION ORIENTED: The CESE shall be designated as the ESMI TCP/IP client and the RG shall be the ESMI TCP/IP server.

Rationale: Operating robust socket servers in IP requires infrastructure designed to provide security (e.g. firewalls and intrusion detection systems) and reliability (e.g. load balancers, diverse routing). Additionally, this type of infrastructure requires expertise to roll out and to continually operate. Socket clients don't require such infrastructure to provide the same level of security and reliability. Since the ESNet as a whole will have relatively few functional instances, and the CESEs will represent relatively many functional instances, it is desirable to minimize the amount of infrastructure overhead to operate a set of CESEs. Requiring the CESE to be the IP client and the ESNet to be the IP server allows the system as a whole to be less expensive to deploy and operate, as well as more secure. This structure retains the bidirectional nature of the communication between a CESE and an RG.

6.2.2 Protocol Framework

ESMI.Network.0400-0100 While initial implementations may only incorporate text transmission between the CESE and RG, the ESMI and the corresponding network

shall be capable of supporting the transmission of images, video, high resolution graphics, voice, and other capabilities through the same channel or additional channels.

Rationale: For many services simple transmission of text is sufficient. However, one of the significant advantages of this architectural concept is the opportunity to offer services that extend the communication to all types of media. If the minimum rate, i.e. 56kbs, is deployed these higher bandwidth services will be severely limited.

ESMI.Network.0500-0100 ~~Section~~Connections between the CESE and RG shall be secured TCP/IP socket connections such that advanced authentication and security features can be implemented.

Rationale: TCP/IP sockets allow managed and monitored point to point application level transport. Such techniques easily extend to support strong authentication, server authentication, and content encryption. TCP/IP sockets can be established and maintained over a relative long period of time, thus, spreading the overhead of establishing and authenticating the connection over a period of time.

ESMI.Protocol.0100-0100 The CESE shall identify its initial ESNet element using logical names and naming services with standard Internet Protocol elements (e.g. DNS).

Rationale: Using standard Internet Protocol techniques will allow CESE to easily and quickly identify available network elements to begin initialization.

ESMI.Protocol.0200-0100 The CESE shall connect to a given RG via mechanisms that allow load balancing of CESE connections across the available RGs.

Rationale: The network implements algorithms to assure efficient use of the network capacity and network elements. This will assure that load can be distributed across the network and among the physical network elements.

ESMI.Protocol.0300-0100 The ESMI shall support mechanisms to ensure constant monitoring of the communication capability between a given CESE and the overall ESNet.

Rationale: Facilities must be monitored to ensure availability and proper functioning. No failure or lack of communication capability should wait to be detected upon an attempt to fulfill an emergency service event.

ESMI.Protocol.0400-0100 The ESMI shall support mechanisms to negotiate appropriate connections from a specific CESE to a RG using session parameters including ESMI version number and shall use standard IP techniques (e.g. Session Initiation Protocol [SIP] and Web Services).

Rationale: Mechanisms to support upgrading the ESMI within a production environment and managing compatibilities is vital. An infrastructure that allows appropriate negotiation of connections will be extensible to other scenarios.

ESMI.Protocol.0500-0100The ESMI shall allow each entity (CESE and RG) to identify its ESMI implementation version during connection initialization to allow interacting components to verify compatibility of their message sets.

Rationale: Capabilities should be put into the message set to accommodate the identification of supported versions of the protocol between two end points. This will allow the CESE or RG to revert back to a compatible version or reject incompatible partners. These primitives should facilitate a smoother migration as we evolve the services made available to PSAPs and other emergency service providers.

ESMI.Protocol.0600-0100The ESMI behavior rules shall specify that if incompatible message sets are determined, the components shall either adjust behavior appropriately or shall reject interaction between incompatible versions.

Rationale: Components can be upgraded without affecting service availability. They can also detect components which are no longer supported and could cause faults in the overall ESNet infrastructure.

ESMI.Protocol.0800-0100 Facilities and algorithms used in failure and recovery situations shall be constantly exercised to ensure they are operating properly.

Rationale: Capabilities used to restore service or work around faults should not wait for a problem situation before being exercised to ensure the facility is working properly.

ESMI.Protocol.1100-0100[BD2] ~~Client~~ CESE and ~~server~~ RG connectivity shall be created and broken down dynamically as ~~servers~~ RGs are ~~taken~~ placed into and taken out of service without causing abnormal processing situations or management alarm failure conditions to be initiated.

Rationale: Unlike the existing fixed relationship between a PSAP link and an ALI, connections from the CESE to the RG are created dynamically. If an RG is taken out of service, the CESE is expected to use an alternate RG under normal processing scenarios. ~~These connections will be managed such that when an RG server goes out of service the connection is re-established to another server.~~

ESMI.Protocol.1200-0100The ESMI between the CESE and the ~~ESNet~~ RG shall ~~be~~ facilitate bi-directional communications. That is for some services the CESE will initiate the action and for others the ~~ESNet~~ RG will.

Rationale: The message set used between the CESE and ESNet has evolved away from the simple query/response of the legacy interface. Depending upon the service either the CESE or the ESNet may initiate the interactions. Certain CESE messages are valid only when sent by a CESE client and others are valid only when sent by a RG server. Each message in the ESMI has a specific purpose and required data elements.

ESMI.Protocol.1300-0100The ESMI protocol suite shall be extensible such that it supports varying data types such as text, graphics, voice, and video.

Rationale: The protocol should be able to encapsulate data types beyond standard text.

ESMI.Protocol.1400-0100The ESMI protocol suite shall be based on industry recognized message headers and allow for variable body contents such as solution approaches based on HTTP, SIP, Web Services, etc.

Rationale: The protocol should be based upon industry standard messaging which supports flexibility in the types of bodies that can be transported.

ESMI.Protocol.1500-0100Every application level message transported between the CESE and RG shall be followed by an immediate acknowledgement message by the receiver to guarantee application level connections.

Rationale: Acknowledgement that a message has been received is minimal overhead and allows the sending entity to verify it was successfully transmitted and received.

ESMI.Protocol.1600-0100Every application level message shall include a transaction identifier that is created by the sender and returned by the receiver in the corresponding acknowledgement.

Rationale: Transaction identifiers are a common technique for quickly and accurately associating a sent message with its acknowledgement.

ESMI.Protocol.1700-0100 The ESMI shall support the application model where the CESE corresponds to a unique identity as exposed to the ESNet.

Rationale: A PSAP is made up of a set of CESEs connections. Having each unique user ~~identify~~ identity correspond to a given CESE connection allows a simpler ESMI application protocol and simplifies administration and security.

ESMI.Protocol.1800-0100The ESMI shall support the ability for a CESE to identify specific positions supported via a given CESE connection. The specific position will be identified by the position number and user identifier.

Rationale: Relating a specific user identifier to a given CESE will enable advanced services, such as, the ability to route notification messages to an individual or to relate specific services to an individual. Positions might be a given call taker, administrative user, etc.

6.2.3 Security/Privacy

ESMI.SEC.0100-0100 The ESNet shall enforce secure authentication with the CESE. Each CESE shall register and authenticate with the ESNet through an RG upon start up. All CESEs shall be authenticated before being allowed to request services from the ESNet.

Rationale: In order to validate that the CESE is authenticated, security measures such as login/password, certificates and tokens are used to authenticate the CESE. Only authenticated CESE sites are allowed to interact with a given ESNet. Strong authentication between network elements can be used and incorporates such methods such as authentication tokens and digital certificates.

ESMI.SEC.0200-0100 The ESMI shall support weak or strong (two-factor) authentication between a CESE and ESNet based on the configuration of the ESNet. Methods for including login, fixed password, and token values shall be present in the initialization message structure.

Rationale: Although strong authentication is highly recommended, not all environments may require or allow strong authentication models and, therefore, the ESMI structure must be flexible.

ESMI.SEC.0300-0100 Once the CESE registers with the ESNet the RG shall provide an authentication session identifier unique across that ESNet instance that is used

to negotiate any future interactions (such as establishing a new connection) within the given ESNet.

Rationale: The CESE need only register once with the ESNet. After that all interactions should be approved through the use of an authentication session identifier. If human interaction is required to complete an authentication procedure, the human must not be forced to repeat the procedure every time an additional CESE to RG connection is established.

ESMI.SEC.0400-0100 All information passed across the network connection between the CESE and RG shall be encrypted.

Rationale: The most secure environment is to encrypt all information passed between the CESE and RG. A fall back position might be to attempt to identify proprietary or customer private information, including passwords, that must be encrypted as transported between physical network elements. However, this will add complexity and could lead to an incomplete solution.

6.2.4 Availability/Survivability

ESMI.Avail.0100-0100 The ESMI shall support mechanisms for dynamic connections and load balancing such that components can be introduced into the network in an incremental fashion without impacting existing services or operation. Also, so that CESEs can be added and connection balanced across the available RGs.

Rationale: A key architectural element is the scalability of the network so components (CESEs and ESNet elements) can be added in a production environment without impacting immediate processing capabilities or services. Routinely balancing connections will allow RG components to be put into service or taken out of service without requiring scheduled maintenance or requiring an infrastructure that sends notices to elements requesting connection changes.

ESMI.Avail.0200-0100 The ESMI shall include mechanisms to regularly verify application level sanity by exchanging heartbeat messages. The ESMI shall support heartbeat application level messages between the CESE and RG.

Rationale: TCP/IP will verify transport level protocol sanity. A method is necessary to ensure, while application level connections are otherwise idle, that application level capabilities exist at both ends of the ESMI before an emergency event occurs. It must be recommended in the ESMI behavior rules that both ends (CESE or RG) issue a ESMI report message and create local application level alarms upon detection of a communication availability failure.

6.2.5 Extensibility

ESMI.Exten.0100-0100 The ESMI shall be extensible such that new services can be incorporated by adding new service identifiers and supporting the corresponding message body transport without impacting the basic ESMI protocol.

Rationale: The initial version of the ESMI will accommodate as many existing scenarios as possible. However, it is expected that the message set will be modified as it is discovered that additional primitive capabilities are required to realize new and innovative services. These primitives should facilitate a smoother migration as we evolve the services made available to PSAPs and other emergency service providers.

ESMI.Exten.0300-0100 Service types shall be supported through Service type ~~identification tags~~identifiers. Currently known service types include:
1) Services that only deliver information to the CESE from the ESNet during an emergency event.
2) Services that deliver information to the CESE from the ESNet during an emergency event and the CESE can transmit information to the same ESNet service.

3) Services that delivery information from the ESNet to a CESE independent of an emergency event and without a corresponding invocation action by the given CESE.

Rationale: Service interaction models identified in the message set during an emergency event allow the CESE and ESNet software components to implement standard interaction models with various services without making specific software changes for every possible service.

6.2.6 Manageability

ESMI.Man.0100-0100 The ESMI shall allow suspension of heartbeat and availability monitoring messages so that they do not significantly impact the processing required to complete core application functions. Automatic maintenance service protocols and messages shall not impact or incrementally add load to primary processing functions when high traffic conditions occur.

Rationale: Maintenance functions will have a lower priority than event processing and will not be required to be transmitted when other activity, such as emergency event messages, are otherwise being transmitted between the CESE and RG and are therefore exercising the application level sanity of the two end points.

ESMI.Man.0200-0100 The ESMI shall allow a CESE to indicate that it is shutting down under nominal processing logic. Therefore, the RG should not raise alarms, should suspend any availability monitoring of the CESE~~'s connection~~ and shall implement applicable shutdown protocols with its CESE client.

Rationale: This will enable a CESE to go to a quiescent state in a clean and uninterrupted manner.

ESMI.Man.0300-0100 The ESMI shall allow an RG to indicate that it is shutting down under nominal processing logic. Therefore, the CESE should not raise alarms and should suspend any availability monitoring of the CESE's connection. The CESE should ~~establish a new connection to an RG and~~ begin submitting all new emergency events ~~on the new connection~~to a new RG.

Rationale: This will enable an RG to go to a quiescent state in a clean and uninterrupted manner. The CESE should attempt to complete all transactions and open emergency events in progress and new transactions shall be directed to the new RG ~~connection~~.

ESMI.Man.0400-0100 The ESMI behavior rules shall indicate that if a CESE loses its connection to an RG before all transactions are completed that the CESE is expected to establish a connection to another RG and resubmit the transactions.

Rationale: Abnormally losing a connection to an RG should be a rare event. However, when it does occur the CESE should take corrective action to complete the transactions in progress.

ESMI.Man.0700-0100 The ESMI shall support messages for the RG to notify the CESE that a call event discrepancy (e.g. an inconsistency between the known events of the CESE and RG) has been detected.

Rationale: Allows notification between the CESE and RG that call event status was incorrect between the two end points, probably pointing to an abnormal event or software defect. Related to ESMI.Report.200-100

ESMI.Man.0800-0100 The ESMI shall support messages for the CESE to notify the RG that a call event discrepancy has been detected.

Rationale: Allows notification between the CESE and RG that call event status was incorrect between the two end points, probably pointing to an abnormal event or software defect. Related to ESMI.Report.100-100

6.2.7 Service Registration Requirements

ESMI.Service_Reg.0100-0100 ESMI shall implement a method upon initialization for the ESNet to provide the CESE with available services.

ESMI.Service_Reg.0100-0200 The CESE shall be able to subscribe to desired services.

Rationale: Through a prearranged method the CESE will be authorized to subscribe to certain services. The ESNet will send the list of authorized services to the CESE when the CESE connects and the CESE will accept those services. The ESNet will not provide services to a CESE to which the CESE has not subscribed.

ESMI.Service_Reg.0200-0100 ESMI shall implement a method for the ESNet to provide the CESE with updates (i.e. adds, deletes, changes) to available services.

Rationale: There may be situations where the ESNet sends the list of services during an active session. It may be that a service has been added or a service has transitioned to/from online.

6.2.8 Emergency Call Event Services

ESMI.EmergEvent.0100-0100 The ESMI shall support the interleaving of queries and responses for multiple Emergency Events.

Rationale: The CESE may handle multiple calls simultaneously. So the CESE may possibly have multiple Emergency Call Events open at the same time. The response to queries for an Emergency Event may vary based upon where data is located and the type of call. For example the response for a wireless Phase 2 call may require significantly more time than a wireline call and may result in multiple responses from the RG to the CESE.

ESMI.EmergEvent.0200-0100 The ESMI shall provide a method for the ESNet to correlate an emergency event submitted from a CESE with all responses generated from the ESNet and sent to the CESE. The ESNet shall assign each Emergency Event a unique identifier called Emergency Event Identifier (EEI).

Rationale: For each message that is of a query/response type a method such as a transaction ID is required to allow the originating party to correlate the request with the response. The Emergency Event Identifier shall be used to correlate all messages associated with a specific event.

ESMI.EmergEvent.0300-0200 The ESMI behavior rules shall specify that the ESNet generate a non-reusable unique identifier for each emergency event per PMI.EmergEvent.0200-0100 and that it is unique across the given ESNet instance.

Rationale: This identifier is unique to this event instance and is persistent through the duration of the event. The identifier is unique across all instances of events within the instance of an ESNet.

ESMI.EmergEvent.0400-0100 When an Emergency Call Event is complete the CESE shall issue an event complete message to the RG. It may pass in the event complete message any local notes that may have been collected during the processing of the event or may send notes after the event complete message is transmitted.

Rationale: When the call is terminated and the call taker completes activity associated with the event, a call termination message must be sent to the ESNet to allow it to clean up transient data and log the event. This notification also allows the RG to recognize that no further services for the event are to be sent to the CESE.

ESMI.EmergEvent.0500-0100 When a CESE issues an Emergency Call Event to the RG, the ESNet shall determine if there is an existing event open for the given Event Key identified for the event. If there is an open event, the CESE will be notified that another CESE is currently engaged in an open event and the ESNet will use the existing Emergency Event Identifier for the additional CESE responses.

Rationale: These features allow correlation of the same events across CESE call takers and can facilitate cooperative features between the CESE call takers.

ESMI.EmergEvent.0600-0100 The ESMI shall provide a message indicating to the CESE that a manual ALI retrieval was attempted, but, ESNet administration prohibits this PSAP from completing a manual bid.

Rationale: Due to local government regulatory constraints many PSAPs cannot perform manual ALI bids. The ability to prevent manual ALI retrievals can, from a practical and historical point of view, be implemented in either or both the CPE and ESNet.

6.2.9 CESE Transfer Services

ESMI.XFER.0100-0100 When an emergency call, as defined by an open Emergency Event and Event Identifier, is transferred from a given CESE to a secondary destination, the CESE shall notify the RG that the transfer is taking place. The CESE will include the transfer destination information such as TN and/or transfer destination identifier.

Rationale: Having the CESE notify the ESNet will allow the ESNet to implement services and recognize multiple accesses for the same call event.

ESMI.XFER.0200-0100 The ESMI shall support passing of any local notes, supp. Info and TTY text, if available, from the CESE to the ESNet gateway that may have been taken that relate to the event.

Rationale: When a call is transferred there may be useful data collected at the originating CESE which could be helpful at the transferred to CESE. If the originating CESE notifies the ESNet of the event and passes the data, it can be available to the transferred to CESE when it queries.

ESMI.XFER.0300-0100 Upon detecting a previously existing event, the RG shall return all relevant event information along with the existing Emergency Event Identifier and any local notes & supp info and TTY text that may have been uploaded to the ESNet.

Rationale: When a call is transferred and the transferred to CESE queries, the ESNet may associate the events and pass the existing Emergency Event Identifier and any local notes that may have been provided.

ESMI.XFER.0400-0100 ESMI shall support a message notifying a given CESE that an additional CESE has joined a given call event as identified by the Emergency `Event Identifier. Both the existing CESE and the joining CESE receive this message.

Rationale: This capability enables a CESE to implement services and features based on knowing that another call taker with ESMI capabilities is engaged in the given call event.

6.2.10 Instant Messaging

6.2.11 Information Discrepancy Services

ESMI.DISC.0100-0100 The ESMI shall support an information discrepancy notice from the CESE to the RG if a specific body of information provided in an Emergency Call Event is found to contain errors. The message need not be sent from the CESE to the RG during the actual open emergency event message sequence.

Rationale: Automated reporting of information errors (such as ALI) can result in dramatic 9-1-1 data improvement and reduction of timeframes required to report problems and have those problems corrected in the information source providing database.

ESMI.DISC.0200-0100 The ESMI shall support a flag indication on an Event Response information body basis as to whether automated discrepancy reporting is supported for the information packet by the given information provider.

Rationale: Information provided via the ESMI can be provided from varying information source providers. Each information source provider must be able to accept automated discrepancy reports or the ESMI must not create said discrepancy reports. In no case shall a report be sent that the information provider is not prepared to properly handle.

ESMI.DISC.0300-0100 The specific ESMI message from the CESE to the RG that indicates an information discrepancy shall support a textual description indicating the problem, issue, or the correct information related to the given information discrepancy.

Rationale: During a call it is possible that the call taker obtains information that illustrates that the display information is incorrect. They may use this capability to notify the ESNet of the difference between the received information and that obtained during the call. This message may also be sent after an Emergency Call Event if a supervisor first triages the information. This notification requirement supports reporting of discrepancies in English Language Translations (ELT).

ESMI.DISC.0400-0100 The CESE shall support a misroute discrepancy notice from the CESE to the RG if the call taker detects that a call directed to their PSAP should have been directed to a different PSAP. This message will support a textual reason description field that can be filled in by the call taker.

Rationale: Call misroute reports are another common problem that needs automated management.

6.2.12 Notification Services

ESMI.NOTIFICATION.0100-0100 The ESMI shall provide the capability to send an informational message (Notification Service Message) to a specific CESE, a group of CESEs or all CESEs.

Rationale: Notification Service is a native service that allows an authorized "agency" to send a message to one or more CESEs. An example may be an Amber Alert advisory.

ESMI.NOTIFICATION.0200-0100 The ESMI shall support Notification Service Message addressing using Notification Service End Points. The latter shall be represented using a URN URI syntax specific to the ESMI namespace, in accordance with IETF RFC-2141 (URN) as the notation for Notification Service Message addressing.

Rationale: Using a URN URI notation provides the necessary "naming" flexibility and a standard reference for syntax rules. Assuming "**esmi**" is the retained URN Namespace Identifier and that "nsep" represents the Notification Service End Point concept, then all message addresses would have the form "**urn:esmi:**nsep= …", where "…" represents a specific end point in dotted notation. For example: "*" would address all CESEs, "*.supervisor" would address all "supervisor" roles for all CESEs.

ESMI.NOTIFICATION.0300-0100 The notification service shall have the capability of sending text, graphics and video clips.

Rationale: All categories of media will be available to the CESE with the notification service.

ESMI.NOTIFICATION.0400-0100 The notification service shall have the capability to send Universal Resource Identifier (URI) link to information which the CESE may use to obtain additional information.

Rationale: Additional information may be available beyond that which is transmitted to the CESE. Links, such as a URI, may be transmitted in the message and the CESE may use the links to obtain additional information.

ESMI.NOTIFICATION.0500-0100 The CESE shall have the capability to notify the RG that it received a notification message that it should not have received.

Rationale: This may be the case that the CESE has received a message which it does not support. This could be because of an administrative error where there is a mismatch between the CESE and the ESNet regarding supported services.

ESMI.NOTIFICATION.0600-0100 The CESE shall have the capability to notify the RG that a valid notification message was not deliverable.

Rationale: The CESE may have an issue with receiving and propagating a valid notification message to the user or in some other manner cannot process a valid message.

6.2.13 Report and Status Services

ESMI.REPORT.0100-0100 A given CESE shall have the capability to request the status of a specific or all Emergency Call Events that are active within the ESNet pertaining to that CESE or related to the PSAP (group) that the given CESE belongs.

Rationale: The call taker, supervisor, or administrator at a CESE should have the capability to obtain the list, and relevant information, for all active Emergency Call Events relating to their call taker position or their PSAP in order to reconcile the status of processing of the event.

ESMI.REPORT.0200-0100 The RG shall have the capability to request the status of a specific, or all, Emergency Call Events that are active for a given CESE. Status will consist of in-progress or complete, engaged in a transfer or not, IM active or not, Emergency Event Identifier, and whether the call contains optional notes, info and TTY.

Rationale: The RG will need the ability to update the state machine processing logic for a given or for all events for a given CESE connection in order to ensure processing logic and to detect “hung” emergency event processing situations.

ESMI.REPORT.0300-0100 The CESE shall have the capability to request an activity report regarding current or recently concluded Emergency Call Events.

Rationale: It may be useful for the CESE to request a management information report that may be used to survey historical activity. This report may include events segmented by class of service, events received over a reporting window (day, week, etc.) and other such selection criteria.

ESMI.REPORT.0400-0100 The RG shall have the capability to request a configuration report from the CESE.

Rationale: For trouble shooting and management it is useful for an administrator at the Emergency Service Provider to obtain current information regarding the configuration parameters of the CESE. This report may include network connections, number of position supported by the CESE and other such configuration-related information.

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