

CRTC Interconnection Steering Committee (CISC)
Emergency Services Working Group (ESWG)

NG9-1-1 Architecture for Canada – Assessment of the Usability of the NENA i3 Solution for Canada

Task: ESTF0077 (TIF77)

Consensus Report: ESRE0070

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Final Version 1

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1 EXECUTIVE SUMMARY

The CRTC Interconnection Steering Committee (CISC) Emergency Services Working Group (ESWG) has been following and reporting on the progression of Next Generation 9-1-1 (NG9-1-1) since June of 2010. The Telecom Regulatory Policy CRTC 2014-342 – 9-1-1 Action Plan details important collaborative steps, including an early 2016 proceeding specifically defined to review the telecommunications regulatory framework for NG9-1-1. In order to assist in preparations for this proceeding, the ESWG 9-1-1 stakeholders have undertaken an initial analysis of the National Emergency Number Association (NENA) i3 Architecture for consideration as the baseline reference architecture for NG9-1-1 in Canada.

Through the ESWG's continuous monitoring of NG9-1-1 deployment initiatives in the United States and abroad, the ESWG determined that while various methodologies and architectures are used, all are based on the NENA i3 standard. The ESWG has concluded that now is the appropriate time to determine the baseline reference architecture for the planning and phased transition to NG9-1-1, and the evolving NENA i3 Architecture has all the elements necessary to start the roadmap for NG9-1-1 in Canada.

In addition, confirmation of NENA i3 as the reference architecture will facilitate the following critical next steps for all 9-1-1 stakeholders in Canada:

- 1) Provides a level of confidence that the roadmap foundation is set, so investment in operational and technical planning can start without concern for stranded investment;
- 2) PSAPs can undertake the multi-stage NG9-1-1 planning, budgeting, and purchase approval processes in order to mitigate future implementation delays;
- 3) Permits the recruitment and training of specialized NG9-1-1 resources;
- 4) Assists NG9-1-1 equipment/application manufacturers and vendors with their focus on producing standardized interoperable “off-the-shelf” solutions;
- 5) Sets the foundation for the ESWG participants to move forward with a detailed assessment of NENA i3 and associated standards.

For the reasons noted, the ESWG is recommending that the Commission approve this consensus report, including the Section 6 – Recommendations, to facilitate the work of all 9-1-1 stakeholders and prepare for the early 2016 CRTC proceeding.

2 INTRODUCTION

The Emergency Services Working Group (ESWG) of the CRTC Interconnection Steering Committee (CISC) submits this consensus report to the Canadian Radio-television and Telecommunications Commission (CRTC or the Commission) to meet the ESTF0077 (TIF77) request to assess the NENA i3 Solution as potential baseline reference architecture for Next Generation 9-1-1 (NG9-1-1) in Canada.

TIF77 originated from the ESWG and was approved by the CISC on 19 March 2015. The working group addressed the following questions:

- a) Does the ESWG agree that the NENA i3 Architecture is the way to go for Canada?
- b) If so, would it need any adjustments for Canada? If yes, what differences are required?
- c) Is there an alternative to i3?
- d) Is anyone objecting to i3 either in Canada or U.S.?
- e) In their current development plans, are carriers assuming i3 will be implemented in Canada subject to approval?

The TIF77 sub-committee members have met eight times since January 2015, including a half day at the face-to-face meeting held in late May. Three formal contributions were submitted for consideration, along with extensive discussion which has culminated in the development of this Report.

3 BACKGROUND

The ESWG has followed and reported on NG9-1-1 activities and initiatives, submitting two Status Reports to the Commission; [ESRE0058](#) in January 2012 and [ESRE0067](#) last January 2015. The North American planned evolution of NG9-1-1 is primarily driven by the National Emergency Number Association (NENA) with significant guidance from several key Standards Development Organizations¹ (SDOs). The above-mentioned reports highlighted that the American states that are planning, working on, or have deployed Emergency Service Internet Protocol network(s) (ESInet) and/or pre-NG9-1-1 related systems have done so using the NENA i3 standard model. In addition, the necessary Internet Protocol (IP) front-end interconnection between the 9-1-1 Service Provider networks and the Public Safety Answering Points (PSAPs) is progressing at a good pace and now is the appropriate time to determine the baseline reference architecture for the planning of and transition to NG9-1-1 in Canada.

¹ Reference document for existing and planned standards for NG9-1-1 systems is available from 911.gov at <http://www.911.gov/pdf/NG911-Standards-Identification-and-Analysis-March2015.pdf>

4 ESWG ANSWERS TO TIF77 CORE QUESTIONS

Based on contributions received and through its workgroup deliberations and discussions the ESWG provides the Commission with the following assessments.

a) Does the ESWG agree that the NENA i3 Architecture is the way to go for Canada?

In contribution [ESCO0500](#), Bell Canada submitted that the NENA i3 solution is appropriate as the baseline reference architecture for NG9-1-1 in Canada. NENA is a fully accredited SDO recognized worldwide. Additionally, the NENA i3 solution has been well received internationally² and is currently being considered by major countries outside North America for transitioning to next generation type emergency services ecosystems. NENA i3 is the de facto standard that SDOs refer to when defining NG9-1-1 specific standards. For instance, wireless carriers³ and other groups evolving or planning to evolve in a 3rd Generation Partnership Project (3GPP) IP Multimedia Subsystem (IMS) environment have access now to technical specifications defining interfaces and protocols to interact with the i3 architecture. The NENA i3 solution is largely based on existing technical standards, most notably on the Internet Engineering Task Force (IETF). Furthermore, NENA, as the sole SDO uniquely dealing with 9-1-1 in North America, is quite well positioned to address 9-1-1 and the needs of emergency services. In fact, NENA maintains strong ties with the Association of Public-Safety Officials (APCO) with whom it developed joint technical and operational standards notably for PSAPs, agencies and emergency responders, and with the Alliance for Telecommunications Industry Solutions (ATIS) through which it reaches out to other SDOs like 3GPP. The Federal Communications Commission (FCC), the United States regulator, has a long standing relationship of trust with NENA with respect to 9-1-1 matters. This was reflected in the FCC

² The European Emergency Number Association (EENA) has adapted the NENA i3 model to develop a solution that meets their NG112 specifications and requirements – more specifically the [EENA NG112 Long Term Definition](#) standard clearly states that: “*To ensure global interoperability, EENA has re-used existing standards as much as possible. In particular, the work from the National Emergency Number Association (NENA) has been adapted to European Public Safety Answering Points. The NG112 LTD document defines a long-term architecture for European Emergency Services and remains voluntarily close to NENA i3 standard. The [June 2015 updated version 2](#) reflects the changes to existing standards, specifications, methodologies and the updates which were made to the original June 2011 NENA i3 specification.*”

³ See [ESCO0472](#) on Evolving WSP Network Architecture to IP Interconnection

Report to Congress⁴ on NG9-1-1 recommendations which relied heavily on the NENA i3 standard and NENA's NG9-1-1 technical and functional direction. More specifically, the FCC highlighted that "*the technical architecture (NENA i3) of NG9-1-1 systems has been developed in detail and is well-established*".

In contribution [ESCO0503](#), Rogers supported NENA i3 as the baseline reference architecture and starting point for Canadian NG9-1-1 discussion at ESWG. Rogers noted that "Origination Networks" are an important part of the end-to-end NG9-1-1 architecture and their challenges should not be neglected.

In contribution [ESCO0505](#), a consultant, acting with the support of the Agence municipale de financement et développement des centres d'urgence 9-1-1 du Québec, highlighted key initiatives, specifications, requirements and time consuming planning activities required to properly set i3 and NG9-1-1 ecosystems, pointing to successfully deployed systems in the United States using current version of NENA i3 standard.

At its May 2015 face-to-face meeting in Quebec City, the ESWG requested all participants to provide formal written notification if they planned to submit a contribution with supporting evidence for any other alternative to the NENA i3 Architecture. Notification of intent was to be provided to the ESWG chair at the latest by 9 June 2015; none was received. To the contrary, many parties voiced their support for NENA i3, some indicating that a clear determination is required to allow key technical stakeholders to start moving forward with assessing the NENA i3 solution for Canada.

At its 17 June 2015 meeting, the ESWG agreed that there is a consensus to approve the NENA i3 solution as the appropriate baseline reference architecture for NG9-1-1 transition in Canada.

⁴ Next Generation 911 Advancement Act of 2012 (Pub. L. No. 112-96 (2012)), [Legal and Regulatory Framework for Next Generation 911 Services](#), Report to Congress and Recommendations by the Federal Communications Commission, issued February 22, 2013.

b) If so, would it need any adjustments for Canada? If yes, what differences are required?

The ESWG recognizes and acknowledges that there are currently differences in 9-1-1 implementation, regulation, governance and funding between the United States and Canada. The ESWG believes that no detailed list can be made available at this point in time due to the complex nature of the required assessment initiative⁵. Rather, the ESWG recommends that these differences be highlighted during proposed collaborative reviews within the CISC working groups, and that determinations be made whether adjustments would be required for a Canada-based NENA i3 implementation, as part of the detailed assessments recommended below. Notwithstanding this, the ESWG's goal will be to make as little change as possible, to ensure that we do not propose a markedly different version for Canada.

c) Is there an alternative to i3?

No party proposed an alternative to NENA i3 at the time of the writing of this Report; in fact, no alternatives are in evidence or expected.

d) Is anyone objecting to i3 either in Canada or U.S.?

No party has objected to the adoption of NENA i3 as the baseline reference architecture for NG9-1-1 in Canada. The ESWG observed that emergency services equipment and application vendors are designing, developing, testing and offering solutions that support the NENA i3 standard (version 1) and NG9-1-1 models are currently being deployed in the U.S. using various designs, architectures, interfaces and solutions supported under the i3 architecture.

e) In their current development plans, are carriers assuming i3 will be implemented in Canada subject to approval?

The ESWG received verbal and written confirmations that Canadian carriers do assume a NENA i3 architecture for NG9-1-1 services in Canada. The ESWG notes that Canadian carriers have access now to technical standards defining how a North American IMS originating network should interconnect with a NENA i3 NG9-1-1 Core system.

⁵ Through the ESWG's continuous monitoring of NG9-1-1 deployment initiatives in the United States and abroad, the ESWG determined that while various methodologies and architectures are used, all are based on the NENA i3 standard.

5 ESWG ASSESSMENTS AND FINDINGS

ESWG members submit that selecting an agreed-upon reference architecture early in the process is vital as it does provide stakeholders with the necessary focus and tools in terms of short, mid and long term planning and design. Not doing so would have detrimental impacts⁶ on the evolution of emergency services in Canada. The ESWG notes that there is widespread consensus within the working group that NENA i3 is the appropriate baseline reference architecture for NG9-1-1 services in Canada.

The ESWG is aware that as part of the CRTC's three-year plan, a public proceeding should be launched in early 2016 to review the regulatory framework for the introduction of NG9-1-1 services in Canada, which would result in a policy and a regulatory framework for NG9-1-1 services that meets the evolving public safety needs of Canadians. The ESWG views that a detailed functional, operational and technical assessment of NENA i3 and associated standards will provide valuable input to the Commission with regards to the upcoming proceeding.

The ESWG acknowledges that designing and introducing NG9-1-1 services, and transitioning the current E9-1-1 infrastructure, will be a daunting task requiring rigorous and professional project-based management, planning and structure. The ESWG discussed how best to perform such thorough and deterministic assessments of the technical, functional and operational aspects of the design and transition to NG9-1-1 and concluded that an approach similar to what was done to achieve Text with 9-1-1 service in Canada would be appropriate. To that extent, the ESWG recommends that an “umbrella” TIF be created to manage the project’s scope, and to define the proper guiding and engineering principles. Additional ESWG TIFs (sub-tasks) could be created, as and when required, to address specific facets of NENA i3 and NG9-1-1 services. As examples, the ESWG plans on considering the following sub-tasks as separate work items (in no particular order):

⁶ Consequences may include potential extended design and planning timeframes based on the inability to attract qualified resources. Stakeholders must assign and retain skilled human resources to begin looking at the scope of work and task breakdowns immediately. Appropriate specifications and a requirements framework take time to develop with regards to applicable solutions; delays in setting a cohesive unified direction would result in a direct ripple effect downstream for service providers, vendors and agencies.

- a. Additional Data Requirements and Considerations (e.g., subscriber information, floor plans, hazardous material warnings, etc.)
- b. Emergency Services Internet Protocol (IP) network (ESInet) and IP Addressing Requirements
- c. NG9-1-1 Network Reliability and Resiliency Requirements
- d. NG9-1-1 Core Services
- e. Civic Address format(s) for Canada, Geographic Information System (GIS) and Master Street Address Guide (MSAG)
- f. Location Validation, Trustworthiness and Reliability Requirements
- g. Transition Considerations and Gateways
- h. Security, Cybersecurity and Privacy
- i. Origination Networks Requirements and Origination Services requiring NG9-1-1 treatment
- j. Interconnection, interface and demarcation point requirements
- k. NG9-1-1 PSAPs and PSAP Technical and Operational Considerations
- l. Policy-based Routing Rules, Inter-jurisdiction Call Routing and Transfer, and alternate and default Routing

The ESWG could then determine detailed task descriptions, pending Commission approval, for each element, in line with the umbrella TIF. The ESWG may create additional sub-tasks, combine or breakdown existing ones, as deemed appropriate in fulfilling its mandate under the umbrella TIF; some topics may be best addressed by other CISC working groups, as appropriate.

If certain aspects of the technical and operational assessments prove to have regulatory or policy implications, the ESWG would refrain from providing recommendations. Rather, it would limit itself to only lay out the possible technical, functional and/or operational options for consideration.

ESWG members noted that, given the investment in human resources involved, a change in framework or roadmap, in terms of baseline reference architecture, down the road, would be

extremely inefficient and costly for every stakeholder. Without a clear direction for moving forward, stakeholders may be hesitant to assign the necessary resources to make progress on this critical work initiative. In addition, PSAPs need to immediately undertake the multi-stage NG9-1-1 planning, budgeting, and purchase approval processes in order to mitigate future implementation delays. The ESWG clearly indicated that submitting a consensus report at this point in time to the Commission, to approve the recommended baseline reference architecture for NG9-1-1 services in Canada, provides all 9-1-1 stakeholders with the appropriate level of confidence that the roadmap would be consistent.

Finally, the ESWG notes that NENA i3 specifically keeps automatic location determination assessments and initiatives out of its scope. In fact, consistent with its predecessor NENA i2⁷, location information details⁸ are expected to be provided with the 9-1-1 call when presented to the NG9-1-1 Core elements, however how such location is determined is currently not defined. The ESWG emphasises that the availability of reliable and trustworthy location information is paramount for emergency services. Given the importance of this subject, the ESWG recommends that a similar approach be used for NENA i3 in Canada, such that automatic location determination solutions are dealt with separately. The ESWG will continue to monitor future developments for automatic location determination, and table a future TIF(s) for CISC approval when required.

⁷ NENA Interim VoIP Architecture for Enhanced 9-1-1 Services (i2), see [NENA 08-001, Version 2](#)

⁸ At a minimum, location information details must include: Wireless Phase II Lat/Long; Subscriber emergency contact information e.g. phone number, email, etc. (not just billing data); Type of device originating the call e.g. cell, VoIP, Wi-Fi, small cell device, etc.; as well as the necessary attributes to properly route the call to the designated primary PSAP as well as fast transfer to the applicable secondary(s). All of these elements are critical to the timely and proper processing of future emergency calls by PSAPs.

6 CONCLUSION

Based on the contributions received, and ensuing discussions and deliberations, the ESWG concludes on a consensus basis that NENA i3 is suitable for adoption as **the** baseline reference architecture for the design, introduction and implementation of, and transition to, NG9-1-1 services in Canada.

Given the importance and consequences of selecting a baseline reference architecture, all stakeholders at the ESWG determined that the recommendations highlighted herein should be ratified by the Commission at this point in time, thus the issuance of this Report. Setting the reference architecture for NG9-1-1 in Canada is required now in order to move forward. Once set, the ESWG can undertake the detailed technical, functional and operational assessments necessary to move NG9-1-1 planning further ahead.

The ESWG recommends that a detailed assessment of NENA i3 and associated standards be initiated at the earliest time, which would provide valuable input to the Commission in light of the forthcoming public proceeding to review the regulatory framework for the introduction of next generation 9-1-1 services in Canada.

7 RECOMMENDATIONS

The ESWG proposes the following recommendations:

1. The Commission approve the adoption of NENA i3 as the baseline reference architecture for the implementation of NG9-1-1 services in Canada;
2. The Commission requests that the ESWG initiate a detailed assessment of NENA i3 and associated standards which would provide valuable input to the Commission in light of the forthcoming public proceeding, to review the regulatory framework for the introduction of next generation 9-1-1 services in Canada;
3. The Commission requests that the ESWG develop an umbrella TIF to manage the project's scope, and to define the proper guiding and engineering principles, and that additional ESWG TIFs be created, as and when required, to address specific facets of the NENA i3 design and transition to NG9-1-1 in Canada;
4. The following initial list of topics be considered in distinct subtending TIFs, under the umbrella TIF:
 - a. Additional Data Requirements and Considerations (e.g., subscriber information, floor plans, hazardous material warnings, etc.)
 - b. Emergency Services Internet Protocol (IP) network (ESInet) and IP Addressing Requirements
 - c. NG9-1-1 Network Reliability and Resiliency Requirements
 - d. NG9-1-1 Core Services
 - e. Civic Address format(s) for Canada, Geographic Information System (GIS) and Master Street Address Guide (MSAG)
 - f. Location Validation, Trustworthiness and Reliability Requirements
 - g. Transition Considerations and Gateways
 - h. Security, Cybersecurity and Privacy
 - i. Origination Networks Requirements and Origination Services requiring NG9-1-1 treatment

- j. Interconnection requirements
 - k. NG9-1-1 PSAPs and PSAP Technical and Operational Considerations
 - l. Policy-based Routing Rules, Inter-jurisdiction Call Routing and Transfer, and alternate and default Routing
5. Automatic location determination solutions will be addressed under a separate TIF, as a future task.

The ESWG recommends that the Commission approve this consensus report and that the recommendations outlined above be adopted at the earliest possible time.

With the production of this report, the ESWG considers its mandate, as set forth in the task identification form, fulfilled in its entirety and recommends that the TIF77 be closed pending any additional direction from the Commission.

APPENDIX A: LIST OF CONTRIBUTIONS

ID #	Date	Originator	Description
ESCO0500	11 May 2015	Bell – Guy Caron	Canadian Architecture Considerations
ESCO0503	19 May 2015	Rogers – Man-Yee Liu	NG9-1-1 Wireless Considerations; plus implications for TIF76 Wi-Fi 9-1-1 Call Processing
ESCO0505	19 May 2015	Bernard Brabant	PowerPoint presentation regarding the NG9-1-1 Ecosystem Interdependencies

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