Canadian Radio-television and Telecommunications Commission
Conseil de la radiodiffusion et des télécommunications canadiennes

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CISC Emergency Services Working Group – Next-Generation 9-1-1 mapping and addressing considerations

Summary

9-1-1 is a bridge that connects Canadians to emergency services in times of need. Federal, provincial, territorial, and municipal governments, as well as telecommunications service providers (TSPs), all play a role in ensuring that Canadians can access 9-1-1 services. The Commission's role is to regulate the TSPs that connect 9-1-1 calls to first responders.

Next-Generation 9-1-1 (NG9-1-1) is a new and improved 9-1-1 service. Once launched, NG9-1-1 will give Canadians and first responders tools that will provide quicker and more accessible communication during emergencies. The Commission acknowledges the importance of NG9-1-1 and will continue to support the transition within its mandate.

Because the transition to NG9-1-1 involves TSPs, the Commission has a role in setting certain technical standards. The CRTC Interconnection Steering Committee Emergency Services Working Group (ESWG) supports the development of these technical standards. The ESWG is composed of expert groups that play distinct roles in providing 9-1-1 services to Canadians. These groups include provincial, territorial, and municipal governments, first responders, public safety answering points, as well as TSPs. Once the ESWG has developed recommendations on a technical standard, it submits a report to the Commission. These recommendations support the Commission in decisions on 9-1-1 services within its role of regulating TSPs.

The Commission asked the ESWG to study the best way to implement a new geographic information system (GIS) data model. A critical requirement of 9-1-1 networks is the ability to accurately determine the location of the caller requiring emergency assistance. Next-Generation 9-1-1 services will make it easier to locate callers using a new GIS data model.

The ESWG filed a report recommending the adoption of a particular GIS data model, as well as the creation of a standardized Canadian civic address format. In this decision, the Commission approves the ESWG's recommendation and requests the ESWG to undertake follow-up work.

Canada

Background

1. When a person makes a 9-1-1 call, their telecommunications service provider (TSP) delivers that call to a 9-1-1 call centre operated by a provincial, territorial, or municipal government. The 9-1-1 call centre, known as a public safety answering point (PSAP), then dispatches first responders to the emergency.

2. For Next-Generation 9-1-1 (NG9-1-1) networks, cases may arise where the normal routing destination of a 9-1-1 call cannot be reached,[1] the PSAP is unable to process the call, or another PSAP is more capable or has been assigned to take certain types of calls. In such cases, policy routing rules (PRRs)[2] are used to direct the call to its intended destination. PSAPs are responsible for PRRs. Sometimes, unforeseen situations may require an immediate change to a routing pattern, which is referred to as a tactical routing change.

3. Most Canadians have access to the Enhanced 9-1-1 (E9-1-1) and NG9-1-1 services, with about 2% living in areas where only Basic 9-1-1 (B9-1-1) services are available. With B9-1-1, the caller must tell the PSAP operator their location. With E9-1-1 and NG9-1-1 networks, the PSAP receives the caller's location based on information contained in the legacy telephone number record formats and the Master Street Address Guide/Street Address Guide (MSAG/SAG).[3] This technology works effectively when an emergency occurs at the billing address on file for a caller, but will not always provide an accurate location if the caller uses a cellphone or nomadic voice over Internet Protocol (VoIP) service while away from that billing address.

4. The implementation of NG9-1-1 in Canada will be based on the National Emergency Number Association (NENA) i3 standard.[4] This standard includes the NG9-1-1 geographic information system (GIS) data model that provides a set of guidelines designed to ensure accurate, consistent, and high-quality data for location validation, routing calls, and dispatching emergency services within NG9-1-1 network. In

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[1] A major weather event where backup PSAPs are unavailable is an example of an exceptional scenario during which the normal routing destinations of a 9-1-1 call may be unreachable and during which routing changes are needed immediately.

[2] PRRs are a mechanism used to direct a 9-1-1 call to a different PSAP. When a 9-1-1 call is placed and PRRs are needed, each rule has a different condition that must be met. If the condition is met, the PRR directs the call to the target PSAP in near real-time.

[3] The MSAG/SAG is a database of street names and house number ranges. It defines emergency service zones within a community and the emergency service numbers associated with them to enable proper routing of calls.

[4] The NENA i3 architecture standard is an end-to-end (Internet Protocol) IP-based network architecture standard for the provision of NG9-1-1 services. This standard also introduces the concept of an Emergency Services IP network, which is an IP-based network that connects telecommunications service providers with all public safety agencies that may be involved in an emergency. The NENA i3 standard was approved by the Commission for adoption in Canada in Telecom Decision 2015-531.

Telecom Decision 2020-150, the Commission requested the ESWG to assess the implementation process for a standardized, nationally available Canadian NG9-1-1 GIS data model.

5. In combination with the NG9-1-1 GIS standard, a common civic addressing format is used for NG9-1-1 services. NENA has developed the Civic Location Data Exchange Format (CLDXF) as the civic address format standard used in the United States. In Telecom Decision 2020-150, the Commission requested the ESWG to assess the creation and implementation of a civic address format specific to Canada.

Report ESRE0102 – NG9-1-1 mapping and addressing considerations

6. The consensus report, ESRE0102 – *NG9-1-1 Mapping (GIS) [Geographic Information System] and Addressing Considerations*, submitted on 9 February 2023 by the ESWG, is a follow-up to its previous interim report, ESRE0089b.

7. The ESRE0102 report provides recommendations on GIS standards on data collection, data aggregation, and tactical routing changes between PSAPs and NG9-1-1 network providers. It also highlights issues for further consideration, such as the adoption of a standardized Canadian civic address format and the creation of a roadmap for implementing the Canadian NG9-1-1 GIS data model across the country. The ESWG plans to address these in a future report.

Canadian NG9-1-1 GIS standard

8. The NG9-1-1 GIS data model (NENA-STA-006) [NG9-1-1 GIS standard] was developed for use across North America and was subsequently amended to include additional considerations specific to Canada. The ESWG recommended adopting the NG9-1-1 GIS standard as the baseline for NG9-1-1 GIS requirements in Canada to support location validation, routing, and dispatch for NG9-1-1 services. NENA published the latest version of the standard in September 2022, but further updates are expected in 2025.

9. An NG9-1-1 GIS standard is required so that NG9-1-1 services can be provided consistently to Canadians across the country. The NG9-1-1 GIS standard created by NENA consists of three types of layers that assist PSAPs in determining a caller's location:

    - "Required" layers that must be available to process a 9-1-1 call on the NG9-1-1 network;

    - "Strongly Recommended" layers that may aid in NG9-1-1 network functionality and may be used for call taking and dispatch operations; and

    - "Recommended" layers that will not be provisioned to the NG9-1-1 network but may be beneficial for a PSAP's reliance on mapping applications to validate location and 9-1-1 call taking.

10. StreetNameAliasTable is a layer within the NG9-1-1 GIS standard that contains alternate street names to help quickly confirm the location of an emergency. While currently a "recommended" layer, the ESWG suggests making the StreetNameAliasTable layer a "required" layer to assist PSAPs in determining the location where emergency services should be dispatched.

Canadian civic addressing format

11. The ESWG noted that some information input fields[5] would need adjustment for Canadian language and addressing requirements in the CLDXF standard. As NENA is working on a civic address format[6] standard specific to Canada, the ESWG has committed to providing recommendations for implementing this standard in a subsequent report.

12. The ESWG indicated that meeting NG9-1-1 GIS requirements will place more responsibility on data providers,[7] such as ensuring timely data delivery. To support this, the ESWG will develop a roadmap with milestones and activities for each key stakeholder to implement an NG9-1-1-compliant GIS data model and a civic address format specific to Canada. The roadmap will include key considerations to support the deliverables of the ESWG sub-working groups working on the transition from B9-1-1 to NG9-1-1 and the transition to geodetic location call routing.[8]

13. While a civic address format standard specific to Canada is being finalized, stakeholders must plan how to adopt the NG9-1-1 GIS standard and the civic address format specific to Canada, including assessing the impacts on associated processes like data provisioning. In this regard, the ESWG has indicated it will conduct further analysis, because many of these activities will be significant and may require additional resources, changes to internal processes, expanded responsibilities and scope of work, and technology. The ESWG also indicated that it will compile best practices regarding GIS data and standards into a standalone document, which will be referenced in the ESWG's next report to the Commission.

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[5] Information input fields for languages are among the input fields that may need adjustment. For example, Canadian English uses different spelling than American English. French-language considerations have also been adopted for street types and directions. The input fields will need to accommodate these examples to ensure a common national addressing format.

[6] This is known as the Canadian Civic Location Data Exchange Format (CLDXF-CA).

[7] Examples of GIS data providers include 9-1-1 governing authorities, and the addressing authorities of municipal, provincial, territorial, and First Nations governments. GIS data providers assign addresses and create, collect, maintain, and distribute location-based data.

[8] In Telecom Decision 2018-217, the Commission approved the implementation of geodetic routing in NG9-1-1. When implemented, wireless 9-1-1 calls will be routed based on the callers' latitude and longitude coordinates. This information will be more accurate to a caller's true location, which will assist PSAPs in responding quickly to emergencies.

Tactical routing changes

14. For NG9-1-1 networks, cases may arise where the normal routing destination of a 9-1-1 call cannot be reached. In such situations, PRRs are used to reroute the call to a backup location to ensure that the 9-1-1 call is answered. The ESWG recommended using PRRs for tactical routing changes, as these changes often need quick action, and GIS staff may not be available at all times. If tactical routing changes are needed, PSAPs should contact their NG9-1-1 network provider to initiate PRRs immediately.

ESWG recommendations and matters for future consideration

15. The ESRE0102 report includes three recommendations to the Commission as follows:

    - approve the adoption of the National Emergency Number Association Next-Generation 9-1-1 GIS data model (NENA-STA-006) as the baseline standard for NG9-1-1 GIS services in Canada;

    - encourage stakeholders (including but not limited to NG9-1-1 network providers, NG9-1-1 GIS aggregators, GIS data providers, PSAPs, first responders, etc.) to include the StreetNameAliasTable as a required layer to facilitate the creation of an NG9-1-1 GIS data model for Canada; and

    - encourage PSAPs to implement tactical routing changes using PRRs in collaboration with their NG9-1-1 network provider, noting that tactical routing changes made through real-time GIS changes are not supported in Canada.

16. The ESWG also submitted that it will provide follow-up reports on the matters it identified for further consideration, including the adoption, impacts, and implementation of the Canadian Civic Location Data Exchange Format (CLDXF-CA) standard as the Canadian NG9-1-1 common civic addressing format, and related best-practices.

Commission's analysis

17. The Commission considers that the ESWG's recommendations are aligned with the objectives of the Commission's NG9-1-1 framework[9] because they are based on standards, nationally consistent, and focused on helping to enhance the safety of Canadians through improved response times for 9-1-1 calls.

18. Regarding the ESWG's first recommendation, the Commission recognizes the need for a baseline standard for NG9-1-1 GIS services in Canada to support geodetic routing. The Commission considers that the ESWG's recommended NG9-1-1 GIS standard, with its specific modifications for Canada, is suitable as a national standard. While the NENA i3 standard assumes access to suitable civic addressing information,

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[9] See Telecom Regulatory Policy 2017-182.

this information is not always available in B9-1-1-served areas. Implementing the NG9-1-1 GIS standard is a key milestone in enabling geodetic routing and transitioning from B9-1-1 to NG9-1-1. Geodetic routing will help improve 9-1-1 services in Canada, as it provides PSAPs with the ability to determine a caller's location even when civic addressing information is not available.

19. Regarding the ESWG's second recommendation, the Commission considers it reasonable to make StreetNameAliasTable a "required" layer because it helps PSAPs confirm the location of emergencies more quickly when alternate street names are used by a caller. While the Commission cannot direct PSAPs to implement changes, it can encourage them to adopt measures that enhance the safety of Canadians.

20. Regarding the ESWG's third recommendation, the Commission considers that PSAPs should be encouraged to implement tactical routing changes using PRRs in collaboration with their NG9-1-1 network provider, because these changes often need quick action, and GIS staff may not be available at all times.

21. Finally, while the ESWG indicated when its next report would be submitted, the submission timeline depends on the release of the CLDXF-CA from NENA, which is still in development without a set date. The Commission expects the ESWG's report to be submitted three months after the CLDXF-CA is published.

Conclusion

22. Accordingly, the Commission approves the ESWG's recommendations in the ESRE0102 report to:

    - adopt the National Emergency Number Association Next-Generation 9-1-1 GIS data model (NENA-STA-006) as the baseline standard for NG9-1-1 GIS services in Canada;

    - encourage stakeholders (including but not limited to NG9-1-1 network providers, NG9-1-1 GIS aggregators, GIS data providers, PSAPs, first responders, etc.) to include the StreetNameAliasTable as a required layer to facilitate the creation of an NG9-1-1 GIS data model for Canada; and

    - encourage PSAPs to implement tactical routing changes using PRRs in collaboration with their NG9-1-1 network provider.

23. Furthermore, the Commission expects the ESWG to file a subsequent report three months following NENA's publication of the CLDXF-CA, addressing the matters identified for further consideration about the potential implementation of the CLDXF-CA.

Secretary General

Related documents

- *CISC Emergency Services Working Group – Consensus report ESRE0089 regarding next-generation 9-1-1 mapping and addressing considerations*, Telecom Decision CRTC 2020-150, 14 May 2020

- *CISC Emergency Services Working Group – Consensus report on matters related to compatibility, reliability, resiliency, and security for next-generation 9-1-1*, Telecom Decision CRTC 2019-353, 22 October 2019

- *CISC Emergency Services Working Group consensus items – Next-generation 9-1-1 technical and operational considerations and trial logistics*, Telecom Decision CRTC 2018-217, 28 June 2018

- *Next-generation 9-1-1 – Modernizing 9-1-1 networks to meet the public safety needs of Canadians*, Telecom Regulatory Policy CRTC 2017-182, 1 June 2017; as amended by Telecom Regulatory Policy CRTC 2017-182-1, 28 January 2019

- *CISC Emergency Services Working Group – Consensus report regarding a Next-Generation 9-1-1 network architecture standard for Canada*, Telecom Decision CRTC 2015-531, 30 November 2015