September 22, 2023

Mr. Claude Doucet, Secretary General
Canadian Radio-television and Telecommunications Commission
Ottawa, ON
K1A 0N2

Dear Mr. Doucet,

RE: Part 1 Application by Representatives of Canadian Public Safety Answering Points (PSAPs) Requesting a Commission Decision in Support of a Pre-Production Next Generation 9-1-1 (NG9-1-1) Network and Quality Assurance Program

Executive Summary

1. PSAPs are preparing their call handling systems (CHS), personnel, and processes for the transition from Enhanced 9-1-1 (E9-1-1) to NG9-1-1 prior to the mandated decommissioning of the E9-1-1 network, and part of that preparation is ensuring there is a robust testing mechanism in place.

2. PSAPs have an increased role in testing as a result of new technologies being deployed in NG9-1-1. In addition, the risk of an interruption to 9-1-1 service operations will increase when a PSAP transitions to NG9-1-1. One of the major reasons for this elevated risk profile are gaps in the currently available end-to-end NG9-1-1 testing capabilities.

3. The current proposed testing solution negotiated in the Emergency Services Working Group (ESWG) means NG9-1-1 network providers (TELUS, Bell, SaskTel) will implement changes directly to the production NG9-1-1 networks without PSAPs having the opportunity to test the change against their systems configuration.

4. In the event of NG9-1-1 system failures, there is a considerable risk to citizen and first responder safety. For a PSAP and its constituent municipalities to transition to NG9-1-1 with incomplete testing facilities, requires an explicit decision to accept the inherent elevated risk of system failures.

5. To mitigate the risk of unexpected system failures and 9-1-1 service impacts due to the introduction of changes in the carrier network, it is essential that PSAPs can connect to a pre-production NG9-1-1 network to perform applicable testing before a change is released to production. Additionally, a program for quality assurance using the pre-production NG9-1-1 network should be established.

Background

6. The analog technology behind the delivery of emergency calls in E9-1-1 has been stable for decades. The few changes that have been introduced (e.g., delivery of location for wireline and wireless devices) did not directly affect PSAP phone systems. Many E9-1-1 phone systems (e.g., Centrex) are managed by the 9-1-1 network providers and little to no interoperability work is needed by PSAPs. As a result, testing programs for E9-1-1 technology have been siloed, with limited coordination amongst Originating Network Providers (ONPs), 9-1-1 network providers, PSAPs, and PSAP technology vendors.

7. In contrast, the NG9-1-1 network relies on Internet Protocol (IP) technology, which is complex and the implementations by the ONPs, NG9-1-1 network providers and PSAP equipment vendors are immature. The transition to NG9-1-1 will require that PSAPs procure and maintain an IP-based call handling system (CHS), which must effectively integrate with both the NG9-1-1 network and other internal PSAP systems. Various aspects of this network and the integration to the PSAP will require regular testing over the coming years.

8. In *Telecom Regulatory Policy CRTC 2017-182*, the Commission determined that the NG9-1-1 service should be extensively tested prior to launch, but the testing requirements following the launch have not been addressed.

9. The transition to NG9-1-1 will introduce a number of ongoing changes that will require testing:
    a. Constituent components of the NG9-1-1 network, and integration of connected systems, will require continuous interoperability testing and bug fixes.
    b. Updates to NENA i3 standards.
    c. Various aspects of IP communications technology require software updates, operating system changes, and general lifecycle management.
    d. Exposure to security risks requires updates to security software and methods.
    e. Introduction of new features (e.g., RTT9-1-1) and points of integration to new system capabilities/applications (e.g., IDX).

10. Any change to the production NG9-1-1 network and integrated systems, including changes managed by ONPs, NG9-1-1 network providers, and PSAPs could result in a failure, partial failure, or degradation of 9-1-1 call delivery. Any failure is likely to result in impacts to 9-1-1 call delivery to one or more of the 252 Canadian PSAPs, putting citizens and first responders at risk. Adequate testing of changes is required in order to mitigate the potential risks.

11. Industry best practices specify that robust testing programs include unit testing of each component as well as integrated testing of system components together in support of real-life workflows. In the case of NG9-1-1, integrated testing means testing the systems end-to-end from the starting point of a call from a subscriber device which must connect to an ONP network, transit through the applicable NG9-1-1 network, and connect to the PSAP CHS software, where it is answered by a PSAP operator.

12. Each PSAP has a unique implementation of systems, including call handling, border control function, security monitoring, call recording, computer aided dispatch (CAD), and others. Each of these components also has a distinct combination of vendors, models, versions, capacity, feature sets, and software, specifically configured for the business of the PSAP. These components require integration testing done in the specific implementation of each PSAP.

13. NG9-1-1 network providers have lab infrastructure available for their testing and change management programs. The position of the NG9-1-1 network providers is that access to any non-production infrastructure is not being planned for any PSAPs in Canada.

ESWG Non-Consensus

14. There is broad recognition amongst ESWG participants that mitigating preventable impacts to 9-1-1 services requires extensive testing and the appropriate testing infrastructure, but there remains a lack of consensus about what specifically should be made available to PSAPs.

15. PSAPs are bound to comply with the NENA i3 standards and User-Network Interconnection (UNI) specifications. There is disagreement between the parties about how technical compliance can be ensured.

16. The PSAP position is that an end-to-end pre-production NG9-1-1 network is required to mitigate risk of failure and ensure compliance to the i3 standard and UNI and any subsequent changes to these specifications. This has been stated repeatedly in verbal discussions within ESWG, as well as in multiple written contributions including:

    a. *ESCO0680 PSAP Input re Future Testing Considerations*
    b. *ESCO0709 Post-Production Testing Program for NG9-1-1 in Canada*
    c. *ESCO0712 PSAP response to the ILEC*
    d. *ESCO0708 re Post NG9-1-1 Launch Testing Considerations*
    e. *ESCO0739 Testing and ESInet Operations and Operational Readiness*

    This topic was also brought up in an intervention to *TELUS Tariff TN565 – Joint EComm9-1-1 Calgary9-1-1 Response*. *Telecom Order CRTC 2022-119* contains a note that it would not be addressed as a part of that order.

17. NG9-1-1 network providers have presented alternative solutions in written contributions including:

    a. *ESCO0708 Post NG9-1-1 Launch Testing – An NG9-1-1 Network Provider Perspective*
    b. *ESCO0745 Post NG9-1-1 Launch Testing – Additional Optionality*

    The solution presented in ESCO0745 is referenced and expanded upon in a contribution by Carlo Chiavaroli in *ESCO0750 Testing and Training Calls on the ESInet*.

18. The various perspectives and contributions have been discussed extensively within ESWG. *ESRE0098 NG9-1-1 Reliability Resiliency and Security Follow-up Report*, section 3.4 summarizes much of the initial discussion, and the pending *ESRE0106 Post-Production Testing*

Report outlines the further discussion on this topic, including summaries of the above-named contributions.

19. The current solution within EWSG is detailed in ESRE0106. This proposal offers CHS vendors and ONPs the opportunity to connect to the NG9-1-1 network providers' labs. It also formalizes the ability for PSAPs to connect their labs to the production NG9-1-1 network. There are no plans to move forward with any version of an end-to-end non-production testing environment, though it is listed as a matter for further consideration in ESRE0106.

Positives of this solution:

20. Allows PSAPs to connect their non-production systems to the production NG9-1-1 network. PSAPs are able test any new version of any component in their system against the production NG9-1-1 network before releasing the change to production.
21. Enables CHS vendors to test their products against changes to the NG9-1-1 network in a pre-production environment before these changes are introduced to the production network and new CHS versions are released to PSAPs.

Deficits of this solution:

22. There is no end-to-end non-production testing environment to safely assess a call path from each ONP through to the PSAP's CHS.
23. **Changes promoted to the production NG9-1-1 network will not have been previously tested by any PSAP**. A PSAP's first opportunity to test a change will be after the change has been promoted to the production NG9-1-1 network and creating a risk to public safety due to unexpected failures.
24. The lack of a separate testing and production environment will cause delays in issues and outage resolution.
25. Vendors are not obligated to connect to the NG9-1-1 lab infrastructure. For those vendors who do choose to connect, it is unrealistic to expect vendors will be equipped to test all unique elements and implementations for all PSAPs.
26. Many PSAPs cannot defer quality assurance programs to their vendors because a vendor would be unable to ensure the proper operation of their full systems complement.

PSAP Position and Proposed Action

27. PSAPs accept the proposed solution as an interim measure towards establishing a testing and quality assurance program. However, without a complete end-to-end pre-production test capability connecting ONPs, CHS vendors, NG9-1-1 network providers, and PSAPs, all future changes to the NG9-1-1 network represent a significant risk to PSAP 9-1-1 operations.
28. PSAPs advocate for the following additional steps, and ask the Commission to consider mandating:

29. NG9-1-1 network providers to make available a pre-production NG9-1-1 network environment, connected to ONP and PSAP lab environments, for the purpose of testing. This environment should mirror the production NG9-1-1 network and allow testing of changes prior to deployment to production.

30. The pre-production NG9-1-1 network must be operational prior to any major changes being rolled out in the production NG9-1-1 network (e.g., RTT9-1-1).

31. All parties should be able to test planned and emergency NG9-1-1 network changes prior to their release to the production NG9-1-1 network.

32. Either through ESWG or another appropriate national body, establishment of a nation-wide quality assurance program to manage coordinated system changes amongst ONPs, NG9-1-1 network providers, and PSAPs. The purview of the program would address the development of:
    a. A quality assurance and change and release management program in the end-to-end NG9-1-1 network, including compliance, interoperability, and regression testing.
    b. Test scripts for compliance and interoperability testing of all functional elements of the NG9-1-1 network.
    c. Change control processes, including notification and scheduling of changes to the pre-production NG9-1-1 network.
    d. Standards for change request and impact assessment documentation.

33. A sustained and equitable funding mechanism to support the development, maintenance and resourcing of testing infrastructure as well as the operational requirements of an integrated quality assurance program. The funding model should take into consideration responsibilities of PSAPs, ONPs, and NG9-1-1 network providers, following the same demarcation as production environments.

Sincerely,

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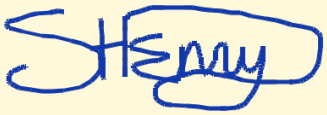

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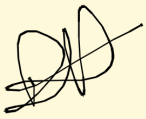

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