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SUBJECT: Interoperability and Coverage Analysis – Executive Summary

This Executive Summary pertains to reports written to address coverage issues and Interoperability for Rensselaer County, New York.

The County retained Blue Wing to review and analyze coverage and interoperability issues that exist with its Public Safety radio system. Although each area has been addressed in separate reports, they are interconnected and dependent upon one another. In other words, addressing coverage through one method may also address interoperability, and vice-versa. For this reason, we have drafted this Executive Summary to tie the separate reports together.

Interoperability Issues
Rensselaer County has been working with the State of New York’s Office of Interoperable and Emergency Communications (OIEC) on various interoperability solutions. During recent meetings, the County was asked to compile a list of interoperability options and present them to OIEC for consideration. Until that list is presented, and the OIEC evaluates each option, no grant funding will be reserved. Therefore, this effort is time sensitive and presenting interoperability options to OIEC for potential grant funding is a priority.

An Interoperability Options report was drafted that addresses advantages and challenges with each of the following approaches:

- Status Quo
- Cross Patch System Programming
- Share Infrastructure
- Shared Core
- Inter Subsystem Interface (ISSI)
- Additional Radio Sites
Each of these options were compared to those geographic areas and government entities that struggle with interoperability and coverage. The focus areas for interoperability, and subsequently coverage, are as follows:

- City of Rensselaer
- City of Troy
- North Greenbush
- Hoosick
- Village of Nassau
- Schodack

**Coverage Issues**

Rensselaer County's new Project 25 public safety radio system provides very good mobile coverage throughout the County and meets the contract requirements of 95% portable on-street coverage. This conclusion is substantiated by the coverage acceptance test plan that was performed by the County’s radio system vendor, Motorola. The results of the coverage testing showed that the coverage exceeded the contractual requirement of 95%, from both the perspective of radio signal and audio quality.

However, after a year of use, a number of areas have been identified that still may require additional coverage. The County currently has identified four (4) areas in which they requested Blue Wing review for coverage. Those areas were as follows.

- Area 1 - Hoosick/Route 7 is most isolated and caused by a topographic depression.
- Areas 2, 3 - The lack of coverage is more widespread with the area in Nassau and the Berkshire Spur.
- Area 4 - North Greenbush coverage issues are mainly located on about a 2 mile stretch in the heart of town. In addition, coverage is also marginal in areas just south of town.

After the review of the coverage, site parameters were analyzed to determine if any changes in site transmit power or antenna configuration could improve the areas lacking in coverage. Further, additional candidate sites were reviewed to determine if currently used sites for microwave could improve coverage,
specifically the Public Safety Building in Troy. It was found the system optimizing using existing sites would have a very small benefit to improving coverage and would not provide the larger necessary improvement.

In addition, the following practices could allow for the optimum use of the radio system.

- Avoid the use of Vehicular Repeaters to provide additional coverage due to the operational complications many users have experienced. Users could benefit greatest from an additional site in the Nassau/Berkshire Spur area. It would be anticipated that one site could solve both areas coverage issues.
- Ensure the use of standard 3 dB mobile antennas, standard or elevated feed, such as the ones shown in the Coverage Report, Figure 6-1 and Figure 6-2.
- Perform inspections of mobile installations, and alignment checks on all radios. Motorola recommends conducting preventative maintenance inspections and tests on all their mobile and portable radios. At the very least, a quality sampling of radios should be performed to ensure reliable operation and optimal performance.
- Review the system management tools to verify roaming between the County simulcast cell and Eagle Bridge is performing as intended. We also recommend performing field tests to confirm roaming and handoff from the simulcast cell to Eagle Bridge.

Conclusions and Recommendations - Interoperability

Detailed conclusions and recommendations are provided in the accompanying reports, but a summary is provided below.

As previously stated, the County has several interoperability options to consider. Below is a list of those options and a high-level recommendation for each.

- Status Quo
- **Benefits:** No cost or coordination required.
  - **Challenges:** Interoperability and coverage remain in their current state, which is not satisfactory. The City of Rensselaer and the City of Troy will not join the County radio system if coverage and interoperability
improvements are not made. North Greenbush will continue to require a patch to interoperate with 800 MHz system users.

- **Recommendation:** Not advised

- **Cross Patch System Programming**
  - **Benefits:** Lower cost and timely solution since much of what is needed to implement this solution is already in place.
  - **Challenges:** According to Motorola, the County’s existing radios can only be programmed for 2 separate systems or fleets, so the expansion of this option is very limited.
  - **Recommendation:** Limited use to address some interoperability and coverage needs for areas noted

- **Share Infrastructure**
  - **Benefits:** Similar to the system programming option, implementation costs are lower and the timeframe to implement is short since all components are in place today.
  - **Challenges:** Entities that require the use of the Albany County 800 MHz radio system will be required to pay a fee, $200 per radio, per year. Solutions for Rensselaer County Dispatch will also need to be determined. This option also requires the radio user to manually switch between systems depending on location and the subsequent coverage they require. Also does not address the coverage issues in North Greenbush.
  - **Recommendation:** Viable only if an agreement can be reached with Albany County on user fees.

- **Shared Core**
  - **Benefits:** A significant benefit of the shared core for Rensselaer County would be to improve coverage in the City of Troy, City of Rensselaer and North Greenbush where there are coverage deficiencies. Rensselaer and Troy agencies operate on independent legacy UHF systems that provide superior in building coverage than the County's 800 MHz system. Rensselaer FD and PD have tested the Albany Metro-Cell and found coverage equal or better than the UHF Legacy System. Also, Albany County’s Metro-Cell and the ASR site at the WRPI tower in North Greenbush will provide needed coverage solutions in Rensselaer, North Greenbush and most of Troy. Troy FD is testing the Metro-Cell
Memorandum

coverage. Troy PD maintains an analog 800 MHz Harris system that is incompatible with Motorola systems. This approach provides a seamless interoperability solution among systems manufactured by Motorola. Inter-system functionality is transparent.

- **Challenges:** The initial largest impediment to this system is to understand the costs associated with the implementation. To date, the concept has been discussed and estimated at a very high level. Another significant challenge to this approach is the loss of the County’s Core, which was just purchased and installed. Further, this approach would reduce the County’s ability to govern and manage its radio system ongoing maintenance costs and upgrade timing and costs. Motorola will need to provide a specific cost of the system and maintenance costs over and above what Rensselaer County currently prepaid in the 10-year radio system contract. The City of Troy is currently testing coverage performance from Albany County and Saratoga County. If a Saratoga County site does not provide coverage, it is possible an additional site will be needed to fully cover Troy with the required in-building coverage. This option also creates a dependency for all systems to be upgraded if one system is upgraded. Therefore, Rensselaer County will be forced to spend money to upgrade its infrastructure if other counties elect to upgrade the system. In short, Rensselaer County would lose its ability to decide if, and when, a system upgrade is implemented.

- **Recommendation:** Very costly solution, both initially and throughout the lifecycle of the radio system. Governance model is also not determined so the method of management for the County’s radio system for this option is uncertain.

- **Inter Subsystem Interface (ISSI)**

  - **Benefits:** Systems connected via ISSI are not dependent upon one another for system upgrades. In other words, each connected system can be upgraded independently of the other. The ISSI connection allows for a reasonably complete set of features and functions for radio users.

  - **Challenges:** ISSI connections are typically expensive. For example, in Rensselaer County, one ISSI device needed in each county for each system (total of 6). The total cost for a single ISSI connection is a significant investment. Maintenance is not typically included in the price of an ISSI. Further, different manufacturers use different tactics, methodology, and terminology as they design and deploy their systems.
Therefore, challenges may occur as manufacturers attempt to connect their systems and configure them for operation.

- **Recommendation:** Viable solution for interoperability. Could also address coverage issues if seamless roaming between systems connected via ISSI can be verified.

- **Additional Radio Sites**
  - **Benefits:** Flexibility in choosing how and where to enhance coverage.
  - **Challenges:** Expensive and time-consuming option. Building additional sites has proven to be an extremely protracted process. As such, it may be years before this option comes to fruition. This option also requires FCC licensing modifications that may or may not be possible. Finally, connectivity will need to be addressed for any new sites.
  
  - **Recommendation:** Leveraging pre-existing sites is a viable option, but the construction of brand new sites is not recommended.

**Conclusions and Recommendations - Coverage**

The testing confirmed that the four areas of marginal coverage have low coverage levels for portable communications. In addition, further analysis indicates the issues would not be solved by changes in ERP or adjustments in antennas. As such, Blue Wing presents the following recommendations:

- **Review maintenance policies to ensure optimum system performance by performing subscriber radio inspections, review site optimizing conditions and site radio equipment performance, to include the following:**
  - Use of appropriate mobile antennas
  - Periodic quality inspections of mobile radios and installations
  - Perform quality tuning inspections on mobile and portable radios

- **Explore additional potential pre-existing sites to solve the coverage issues.**

- **Explore options on methods to leverage Rensselaer County’s, and Albany County’s radio system coverage in North Greenbush. Options for this approach may include sharing system IDs in radios, sharing a common core and/or the integration of an Inter Subsystem Interface (ISSI) between them. It is vital when reviewing these options that a complete specification of the**
capabilities of the new system are documented, the one-time costs and on-going maintenance costs are fully understood.

- Review the system management tools to verify roaming between the County simulcast cell and Eagle Bridge is performing as intended. We also recommend performing field tests to confirm roaming and handoff from the simulcast cell to Eagle Bridge.