



Proposed Reorganization of the Lower 900 MHz Band: Issues and Implications for Tolling from the NextNav FCC Petition



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Baltimore, MD

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Commercial Development in the Lower 900 MHz Spectrum

NextNav provides next generation positioning, navigation, timing (PNT) and 3D geolocation.

- The company filed a rulemaking petition on April 16, 2024 with the Federal Communications Commission (FCC) seeking to rearrange the lower 900 MHz band (902-928 MHz band) to facilitate a terrestrial PNT network and 5G broadband.

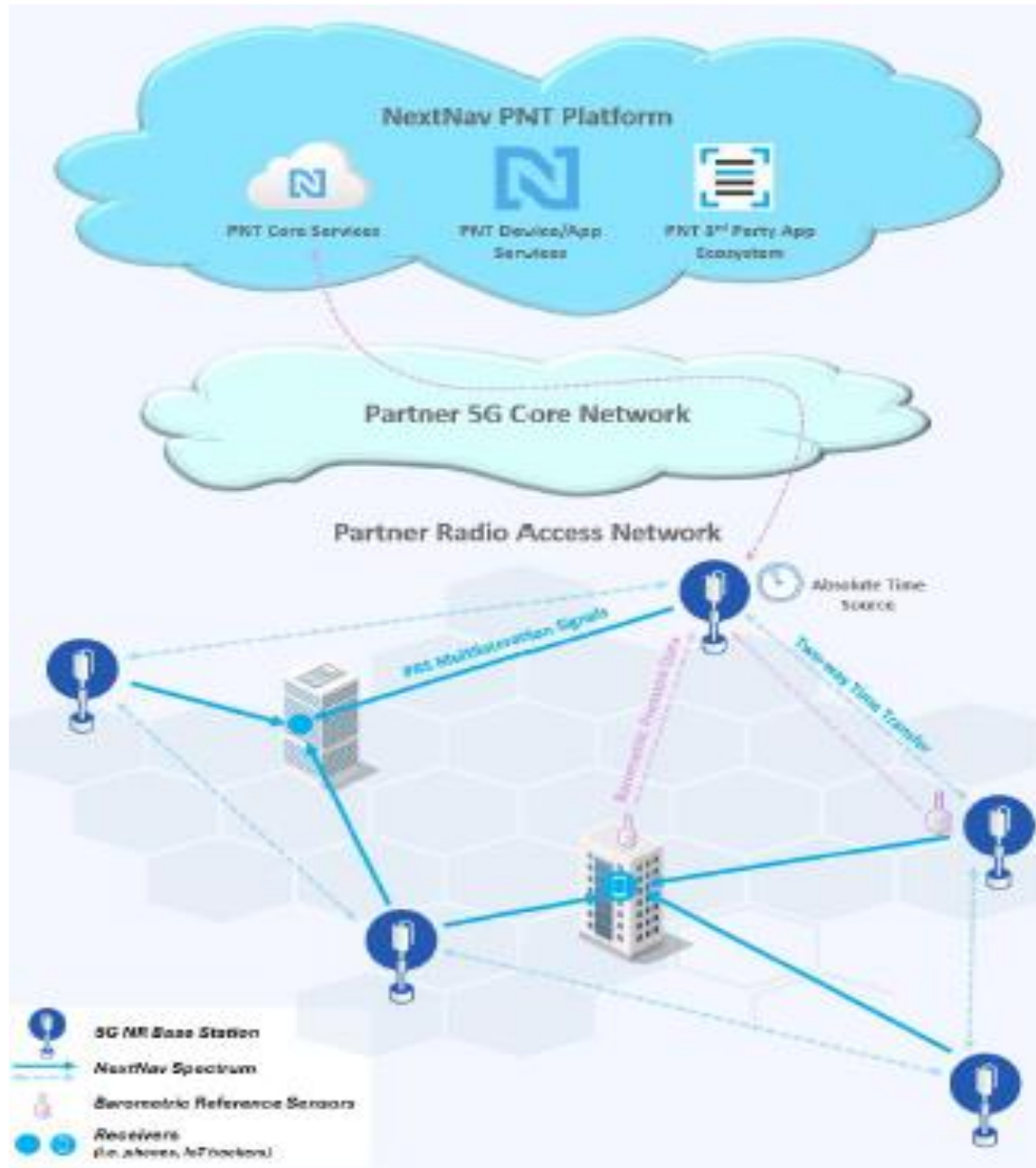
The press release and FCC filing are available here: <https://nextnav.com/lays-out-new-vision/>.

NextNav seems to be avoiding direct conflict with the 915 MHz spectrum used today by US toll operations. IBTTA surveyed members for input on implications or risks to operations and systems.

Do the proposed commercial applications in the spectrum around 915 MHz present risks of interference for existing toll applications?

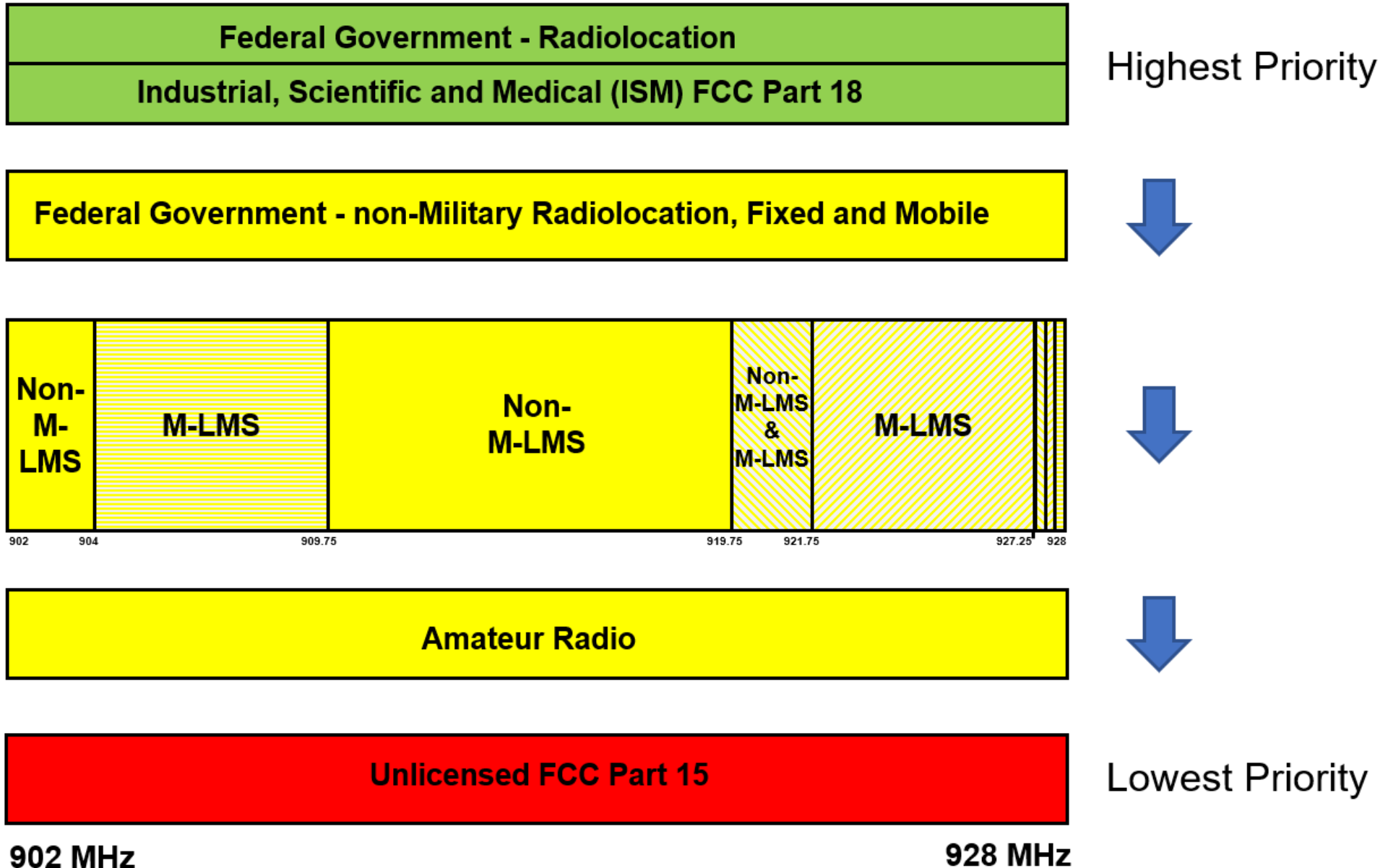
- Risk of signal bleed-over into the tolling spectrum?
- Will a narrowed range require toll system reader upgrades to more precisely restrict toll communication bandwidth?
- How is the future of RUC vehicle telematics communication impacted by private ownership of this spectrum range? How might government applications and interests be protected?

Overview of the NextNav 5G PNT Network Architecture



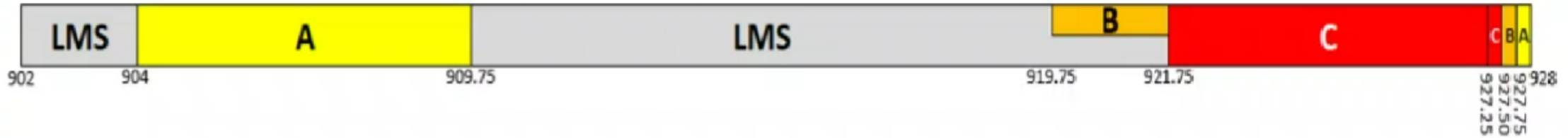
- NextNav’s positioning and timing system will be a 5G New Radio (“NR”) base stations for positioning reference signals.
- The use of 5G PRS is that PNT services can be available both to devices connected to the NextNav partner’s network (i.e., in-network) and to user devices connected to other operators’ networks (i.e., out-of-network).
- A simulation study verified that a 10-MHz downlink channel can provide a single-digit-meter positioning and sub-20-nanosecond timing accuracy at a 95% confidence level.
 - *Key question: Can they live with less frequency where they are encroaching on the 918-921.75 MHz range?*

Current 902-928 MHz Band Plan and Sharing Priorities

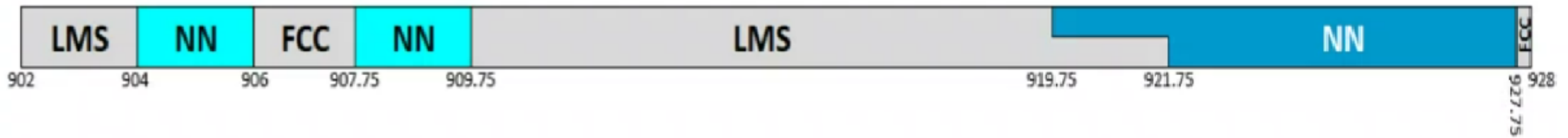


Overview of NextNav's Rebanding Proposal

Current band plan: 14 MHz in three blocks (A, B, C) per EA for "Multilateration Location and Monitoring Service" (M-LMS)



NextNav holdings (including proposed acquisition announced March 2024)

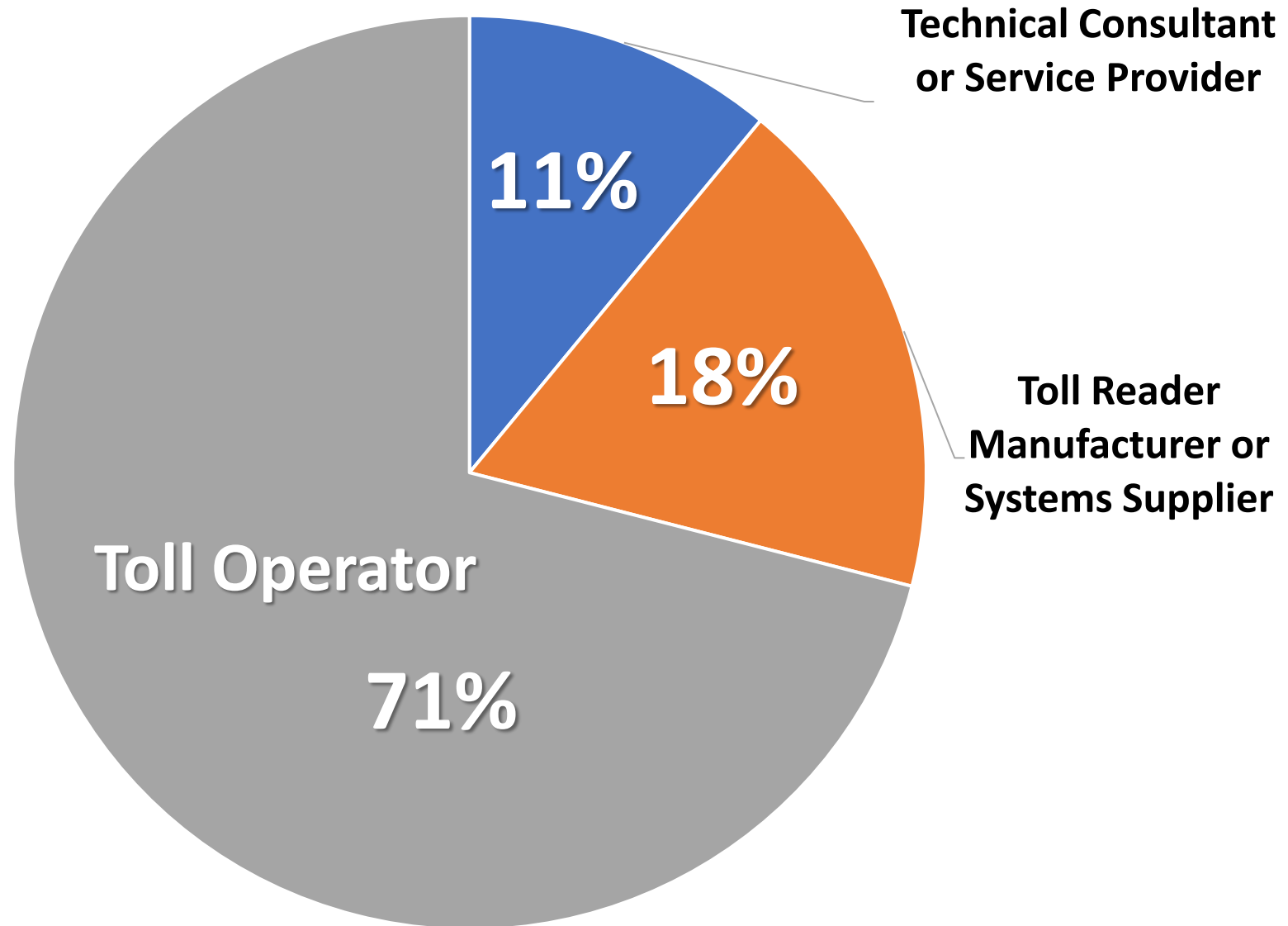


Proposed new band plan: Rationalized and updated to create paired 5+10 MHz block suitable for PNT and 5G services



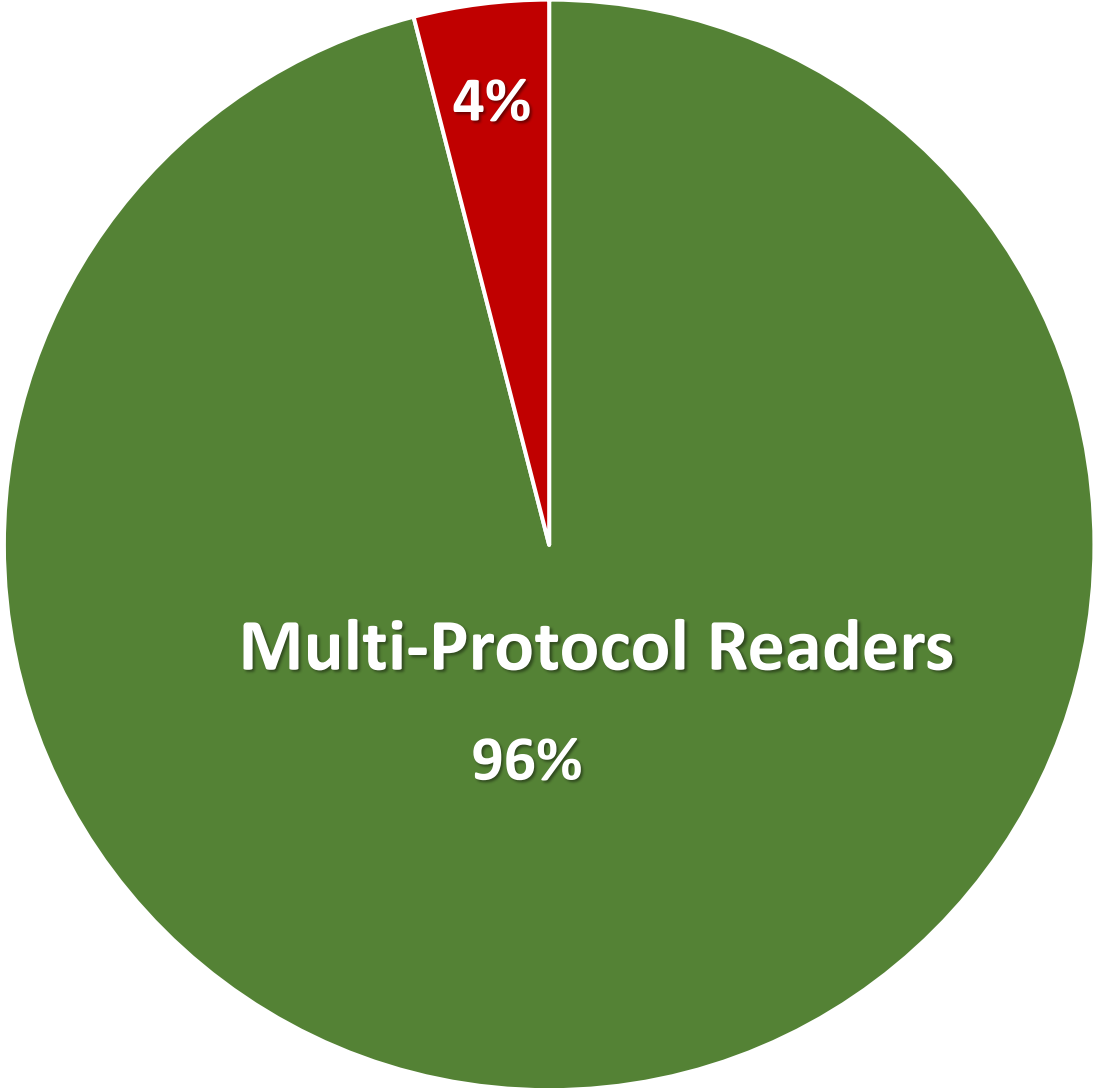
Most common electronic tolling frequencies are: 902-904 MHz and 909-921.75MHz

Responses by Organization Type



Number of Protocols Supported by Deployed Equipment

Single Protocol Readers

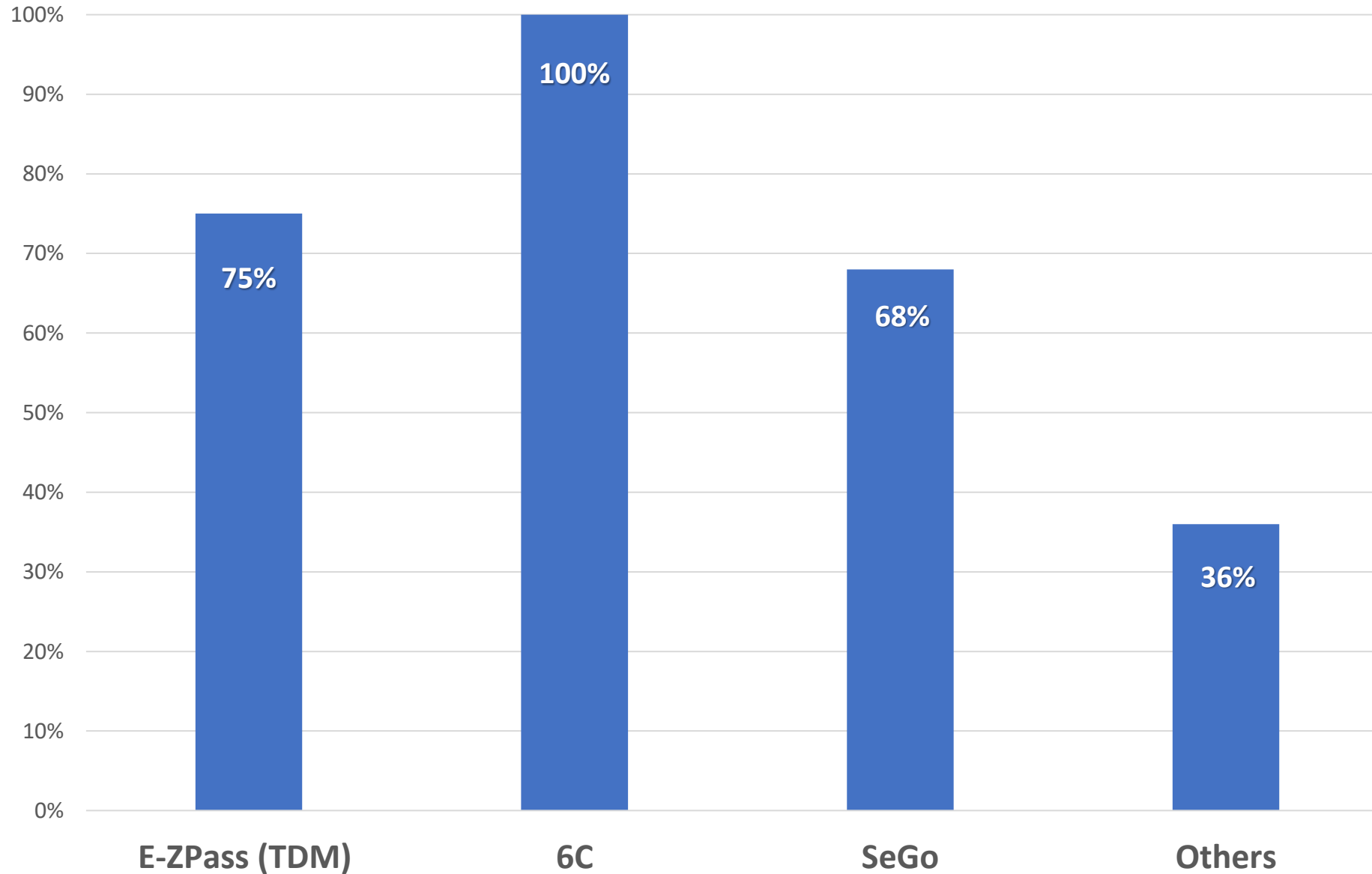


Multi-Protocol Readers

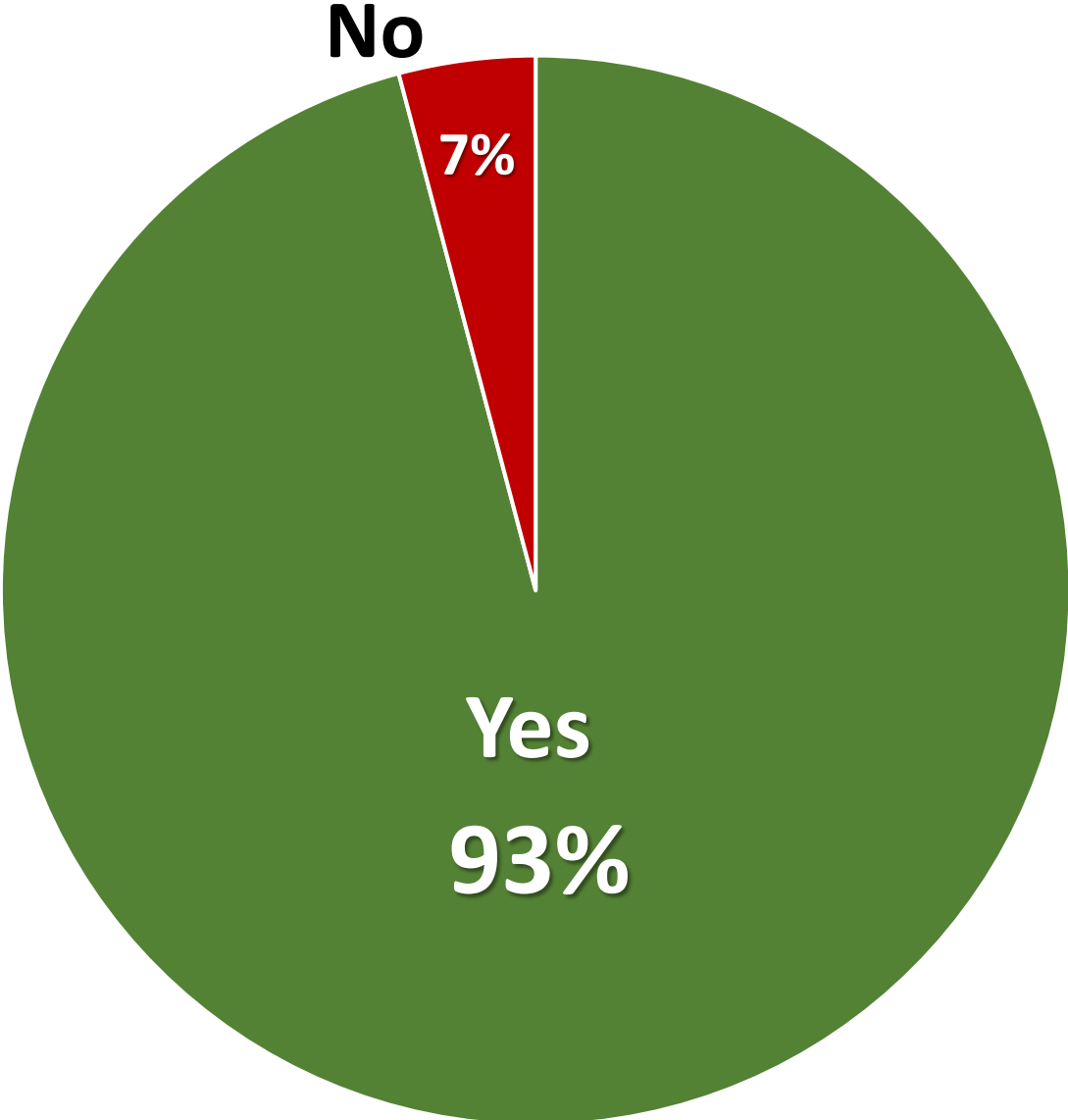
96%

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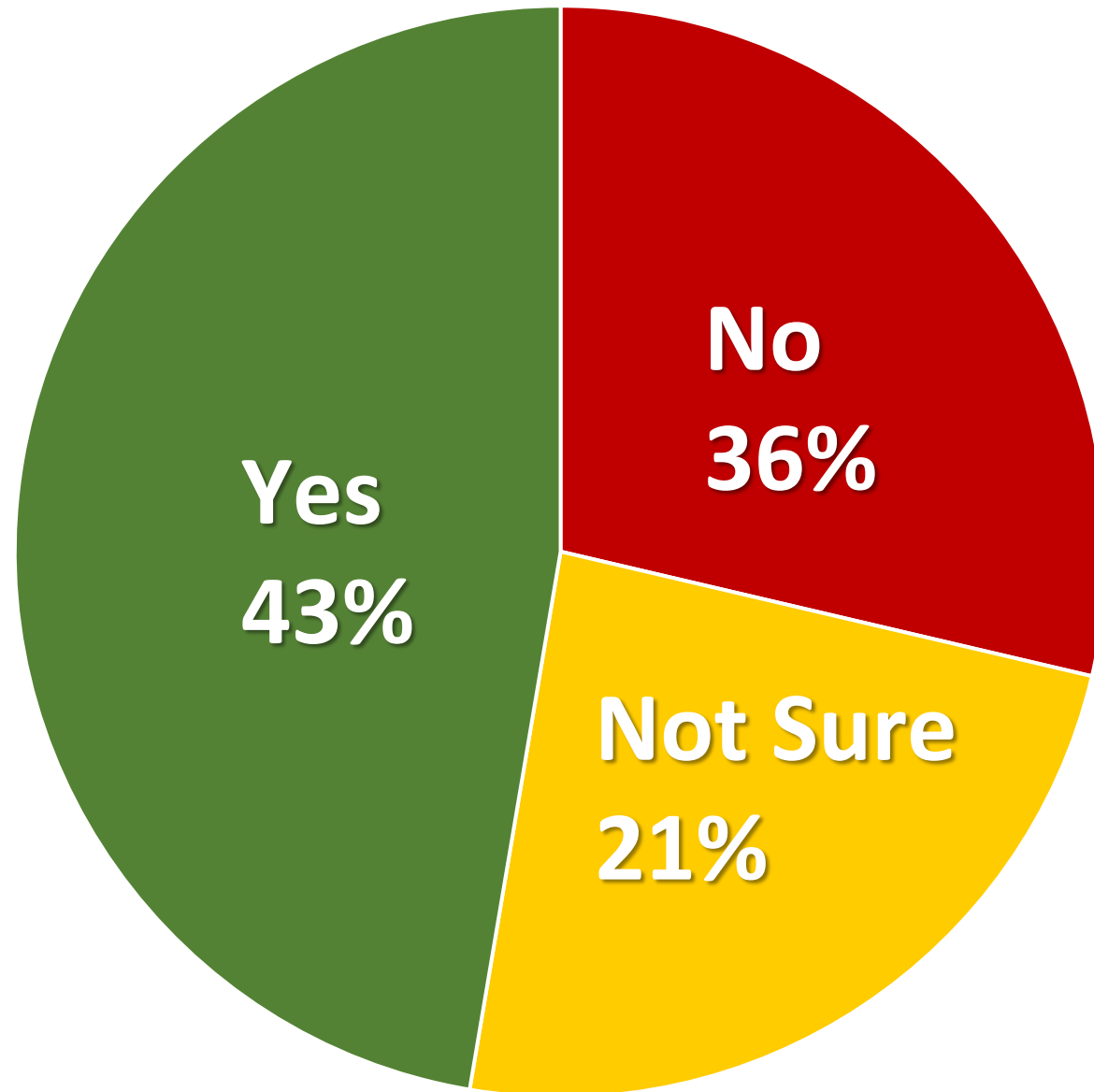
Toll Protocols Actively Deployed and in Use



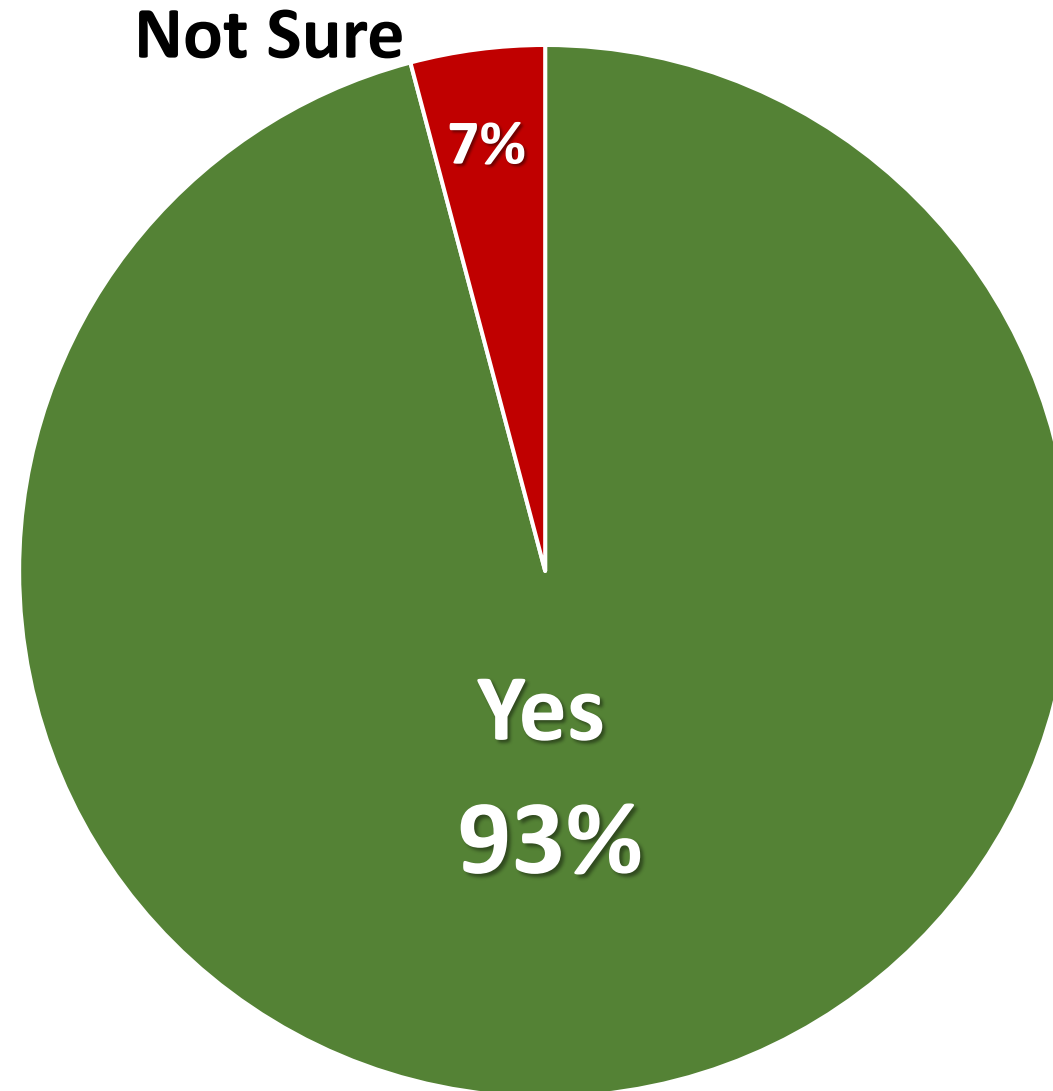
Risk of 915 MHz Interference from New Applications



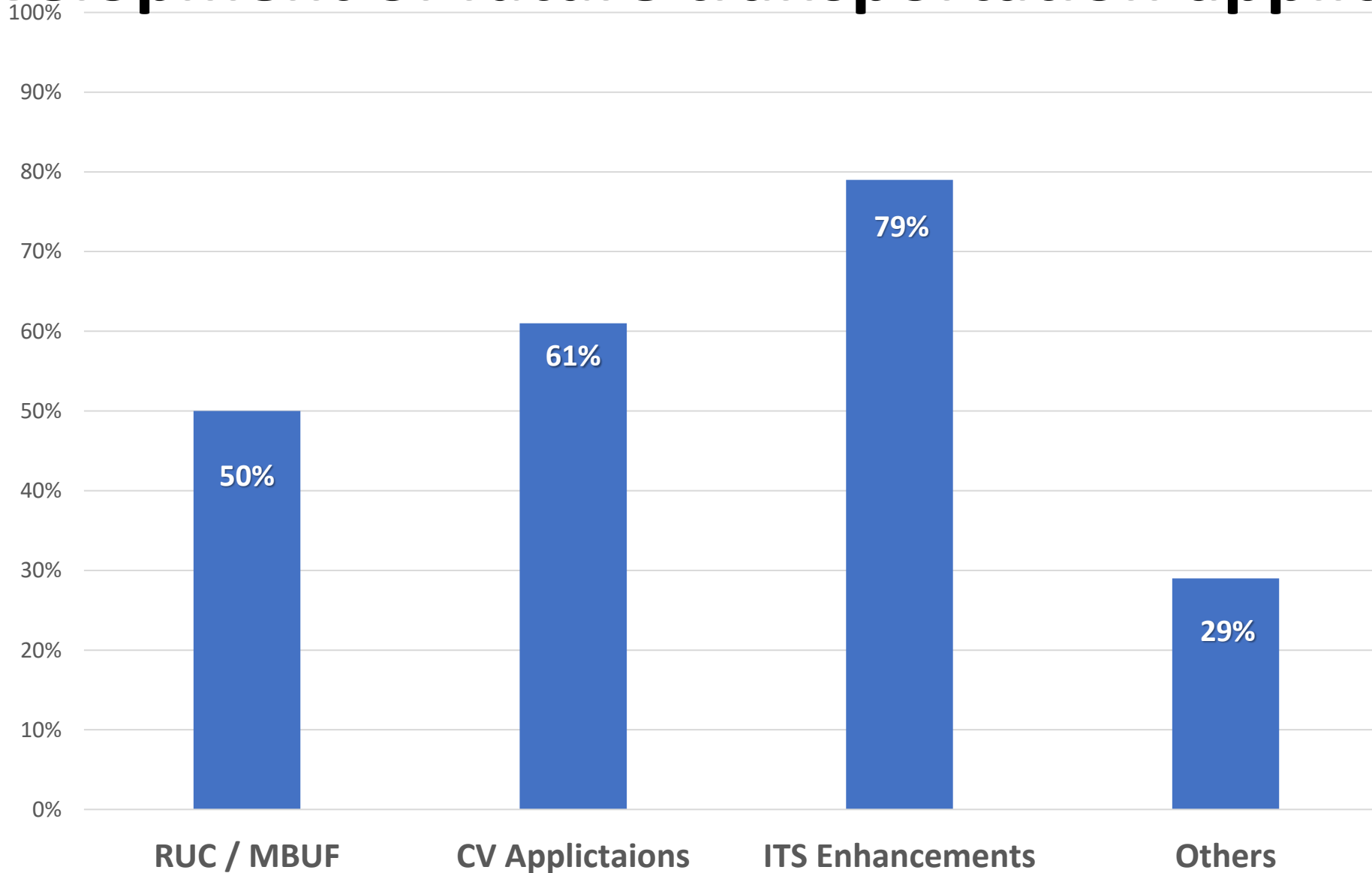
Current Maintenance Routines for Reader Tuning/Re-Tuning



Will More Frequent Toll Reader Tuning Be Needed to Ensure Performance Accuracy?



Will NextNav's petition affect the competitive development of future transportation applications?



Strong Consensus of Opinion on Some Impacts and Concerns

There was unanimous consent among survey respondents on certain impacts and areas of concern:

- New commercial applications in the lower 900 MHz may require upgrades to readers or software to more precisely restrict the bandwidth through which toll transactions are communicated.
- Concern about the implications of a single commercial entity having control of so much of the lower 900 MHz portion of the band.



Performance, Cost and Revenue Risks

Impact to system performance, cost of operations, and revenue.

- Potential for more missed tag reads, driving more costly image reviews.
- Increased revenue leakage resulting from decreased system performance.

Proposal reduces the frequency allocated for tolling by at least 20%.

- All toll sites will need to be evaluated and potentially re-tuned.
- Re-tuning will require additional site licensing from the FCC.
- Off-site pre-test and on-site post-test performance evaluations may be needed to minimize operating impacts.

Reader retuning is costly and disruptive to operations.

- More technical staff time required to complete work and validate performance.
- Maintenance of traffic costs.
- Revenue loss associated with roadway closures to perform the work.

Current band allocation allows flexibility in site plans to address local interference.

- Reducing the allocated bandwidth limits this ability.



Implications for Today and Tomorrow

Current Impacts

- RFID basics are significantly challenged with less contiguous bandwidth, potentially lowering tag reading performance.
- Reduced frequency for non-multilateration location monitoring systems such as tolling may impact performance of some ITS services in densely populated areas.

Future Implications

- V2X capabilities will drive many new use cases, including in-vehicle mobile payments and road safety. Competitive access to telecommunications is fundamental to effective markets and innovation.
- A shift to broadband 5G systems from M-LMS could result in limitations on deploying new sites due constraints from co-existence.
- Research and development of new devices will become more costly for manufacturers. Toll operators may need to relicense or replace equipment, affecting a large deployed equipment base and investment in place.

Industry Outreach and Coordination

We have discussed this matter with industry organizations and agreed to coordinate future actions and industry responses as needed in the future.

- RAIN Alliance - global consortium of users of ISO 18000-63 (6C) RFID.
- OmniAir Consortium.
- ITS America
- AASHTO
- E-ZPass Interagency Group
- 6C Coalition

