

Atkinson Emergency Communications Committee – Technical Team Final Recommendation

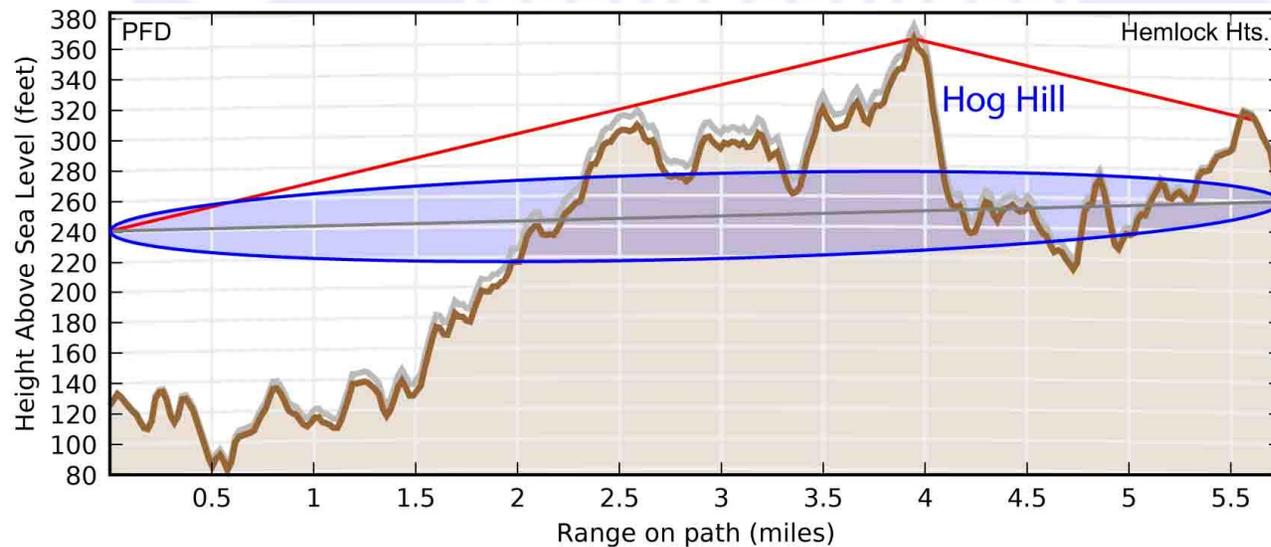


Recommend Solution to Police and
Fire Departments Handheld Talk-Back
Problem to Plaistow Dispatch from
West Atkinson

Atkinson Emergency Communications Committee
Loren Albright – Chairman
Bob Dahlquist – Technical Team
Dean Killam – Technical Team

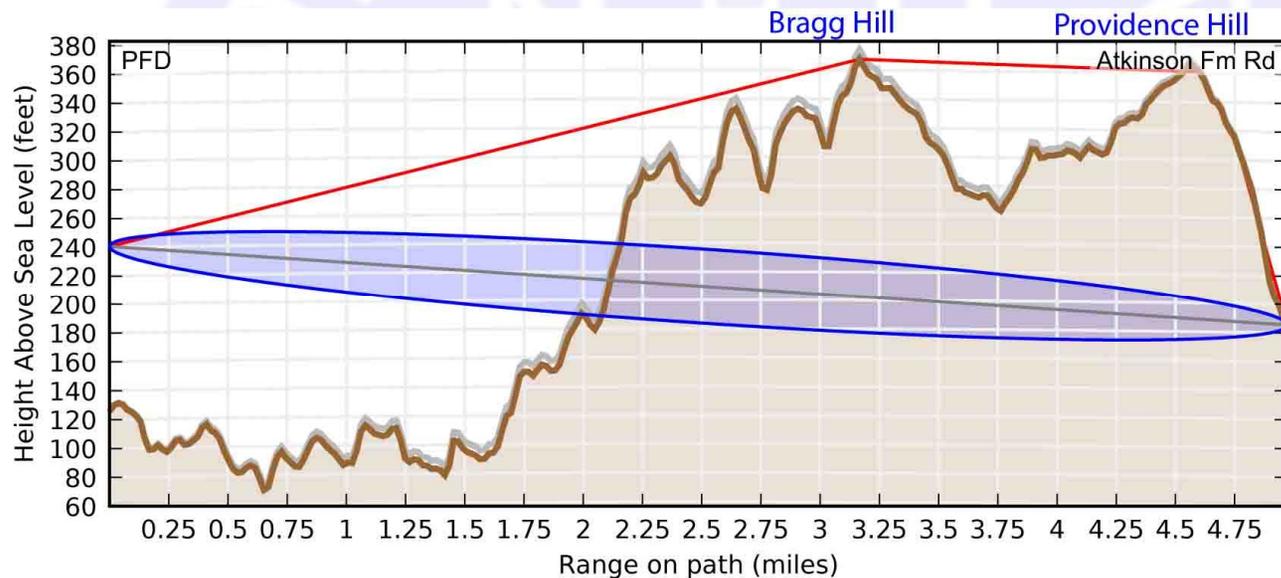
Why Is There a Problem

- Topographical Make-up of Area
- Plaistow to Hemlock Heights



Why Is There a Problem – Cont.

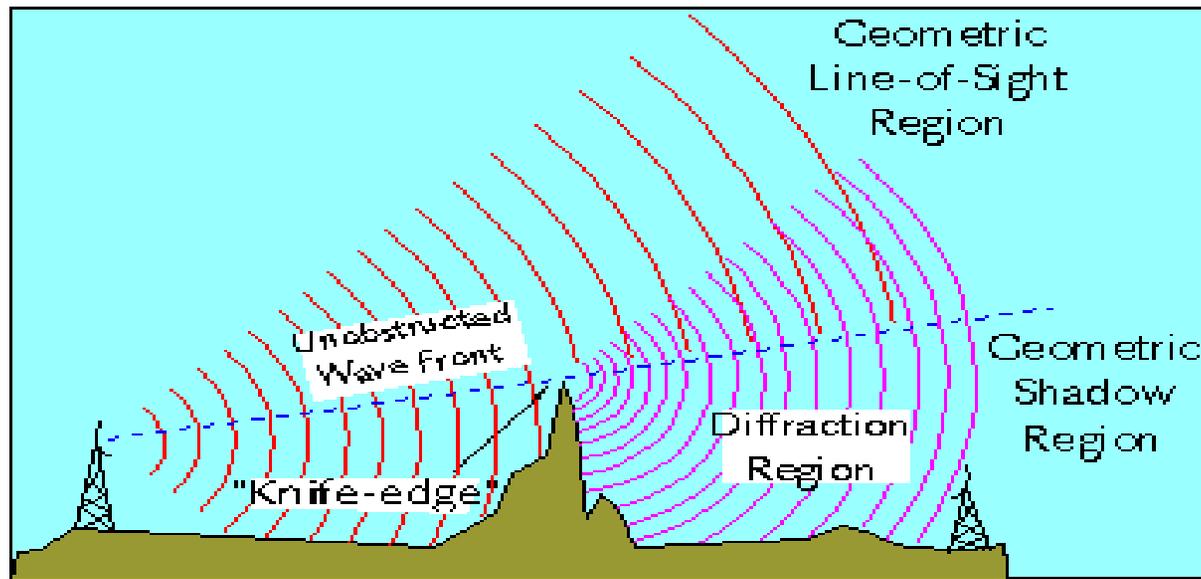
➤ Plaistow to Atkinson Farm Rd.



- Path to affected areas blocked by 1 or 2 hills
 - Knife-edge Effect mitigates this to some degree but not enough to prevent the problem

Why Is There a Problem – Cont.

Knife-edge Effect



knife-edge effect

- Depending on frequency some percentage of a radio wave will diffract downward when encountering a hill

Why Is There a Problem – Cont.

- Low power and mounting method of HT's
 - HT power output = 5 Watts compared to 100 Watts for cruisers
 - HT antenna is lossy. 5 Watts is reduced to 2.5 Watts ERP (Effective Radiated Power).
 - Belt mounting reduces ERP even more, by -16 to -20 dB resulting in a ERP of 0.063 to 0.025 Watts (63 milliWatts to 25 milliWatts)

Solution 1 - Satellite Receiver

What We Know

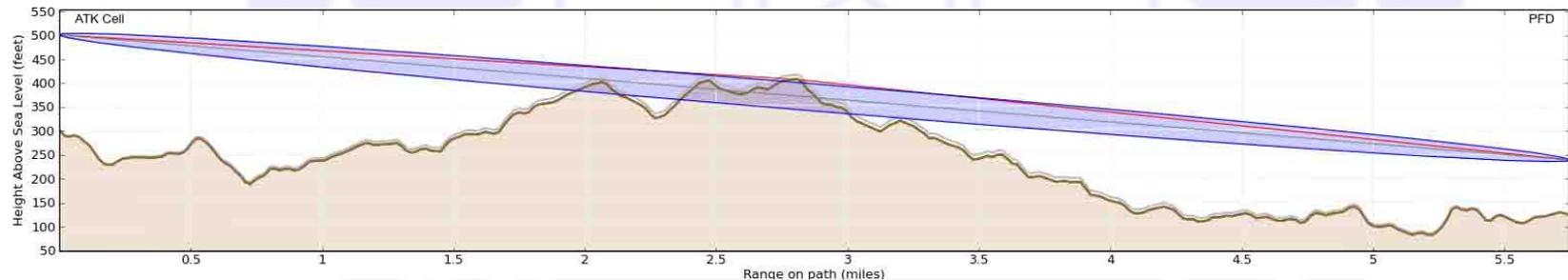
- We know handheld radios (HT's) can hear Plaistow with > 98% Coverage
- Testing by Technical Team has shown a single satellite receiver located at either AFD or available lot across from Kinney's will not provide desired coverage
- Best location for receiver is in NW corner of Atkinson
 - Avoids ridge south of Hemlock Heights
 - Covers low spots along western border

Solution 1 – Cont.

- We have no ready locations available
 - AT&T has a cell tower in area but all attempts to make contact have failed
 - Would they grant permission, and if so, would there be a rental fee?
 - Town owned lots at Waters Edge and Lakeside Dr.
 - These locations are restricted Conservation land therefore unusable

Solution 1 – Cont.

- There is no clear line of sight between NW corner and Plaistow tower
 - Required for microwave link between receiver and Plaistow



Assumptions – Cell Tower 200' High, PFD Tower 120' High
Does not account for probable tree line along peaks

Solution 1 – Cont.

- A MW relay would be required between receiver and Plaistow
 - Equipment is small and light
 - Relay tower would only need to meet minimum structural requirements
 - Tower needs to be high enough to clear tree lines in both directions: 80 to 90 ft.
- There are two possible locations for relay tower
 - Atkinson Fire Department
 - Advantages
 - Availability of 24/7 emergency power and shelter

Solution 1 – Cont.

- Disadvantages
 - Tower would need to be a more expensive, self supporting type
 - Resident resistance is a given
- Empty, town owned lot on Rt. 121
 - Advantages
 - A cheaper, guyed tower could used
 - Equipment could be mounted on tower protected by climb shields
 - Probable less resident resistance

Solution 1 – Cont.

- Disadvantages
 - Lot would have to be sufficiently cleared
 - Access and power would have to be provided
 - Some method of backup power would have to be devised. Battery and solar?

Solution 1 – Cont.

Other Considerations

- Adding a new receiver to the Plaistow police repeater should be relatively simple
- Adding a new receiver to Fire radio would require adding receiver voting equipment to the system
- Issue of dual ownership of equipment would have to be addressed

Solution 1 – Cont.

- Cost
 - Current estimates are between \$70K to \$100K depending if FD is included and MW relay location
 - It is highly probable that these costs are underestimated

Solution 2

Vehicle Repeaters

- How do they work?
 - Basically, they are a small, independent radio in the vehicle tied to the vehicle's primary radio
 - The repeater operates on a frequency separate from those used by the vehicle radio
 - The HT transmits to the repeater, which in turn is rebroadcast by the higher powered vehicle radio

Vehicle Repeaters – Cont.

- For receiving, the vehicle radio receives a transmission which in turn is rebroadcast by the vehicle repeater to the HT
- When there are multiple vehicles with repeaters in the same location a priority resolution process is used to determine a master while the other(s) go into standby
- This process provides seamless operation as equipped vehicles enter and leave location

Vehicle Repeaters – Cont.

What We Know

- Two committee members visited the Danville PD which uses Pyramid SVR-200VND Vehicle Repeaters
 - This model is an analog system at the low end of Pyramid's line
 - Danville is successfully using their P25 digital radios despite the unit being analog
 - The Danville PD states they are very pleased with their repeaters

Vehicle Repeaters – Cont.

- The SVR-200 has, what could be considered, an annoying priority resolution process
 - A repetitive tone used by the priority resolution scheme is constantly transmitted. Some people find the presence of the tone reassuring, others find it annoying.
- Danville's solution is to physically power off the VR for new vehicles entering the area so the tone is not needed. This is not a common practice.

Vehicle Repeaters – Cont.

- The newer SVR-P250 would be the better choice
 - It has an improved priority resolution scheme that would be more acceptable
 - It will operate in either analog or P25 digital mode, wide or narrow band
- Any repeater system requires a new VHF frequency assignment/channel
 - Danville is renting one of four commercial use only channels from 2-Way for a modest cost
 - This issue would have to be addressed if a different vendor were chosen

Vehicle Repeaters – Cont.

- Cost of the SVR-P250 is approximately \$4,000 per unit. Our cost would depend on the number of vehicles to be equipped.
- Other forms of funding, such as seeking public grants, should be actively sought.
- We have been informed that Kingston and Freemont will be purchasing SVR-P250's in the near term with grant funding and that the Auburn PD has already purchased three systems

Vehicle Repeaters – Cont.

A Different Mode of Operation

- The standard mode of vehicle repeater operation is a concern
 - It requires the user to switch from their currently used channel to a new channel
 - Though the priority resolution scheme is improved, it still might be an annoyance
 - The Technical Team suggests a modified mode of operation that may be more acceptable

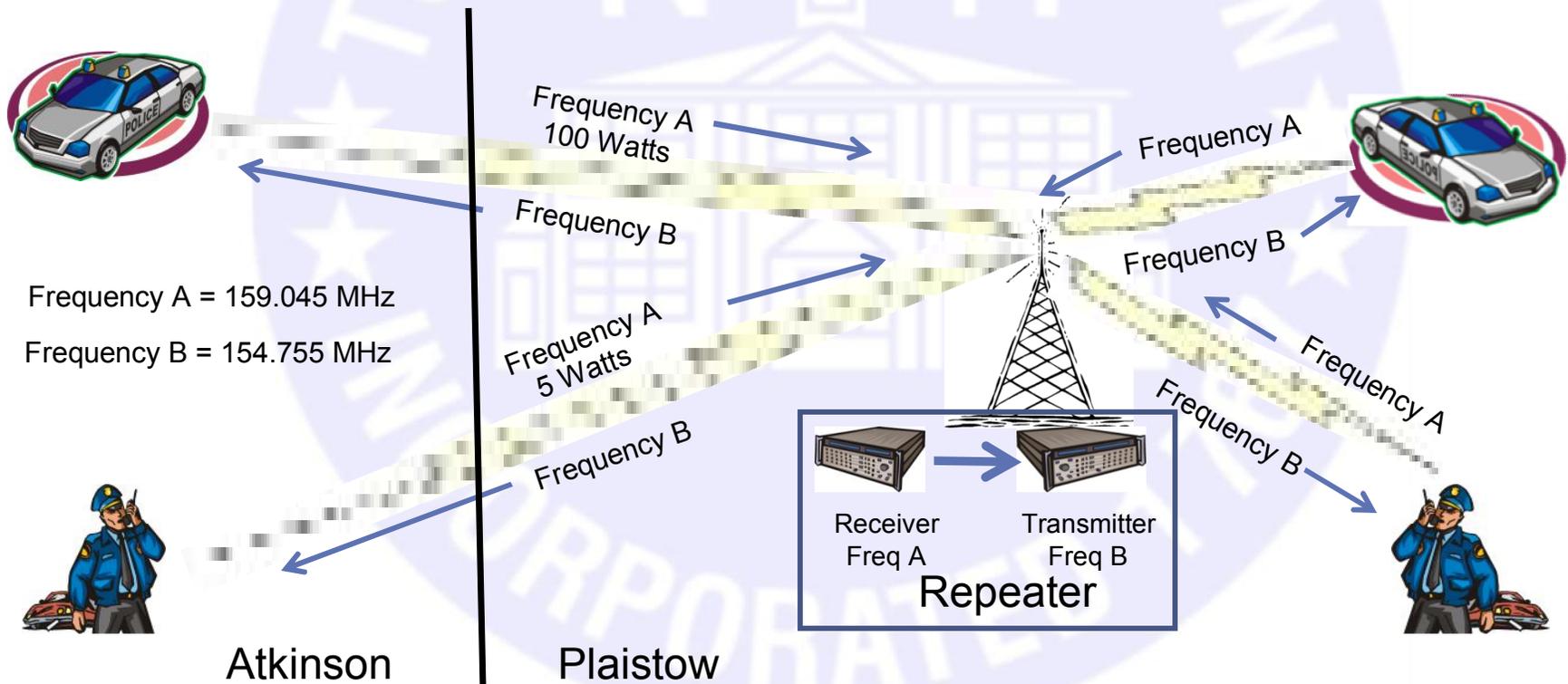
Vehicle Repeaters – Cont.

Hybrid Operation

- Unlike most vehicle repeater users, Atkinson does not have a receive issue, just HT transmit
- Rather than use the repeater's frequency for receiving, continue to receive on the HT's current Plaistow frequency
- The HT would be programmed with three channels
 - Channel 1 would be the current frequency assignments and used the way it is used now, with the same limitations
 - Channel 2 would receive on the current Plaistow frequency but transmit on the vehicle repeater frequency. This would effectively increase the HT's power output to 100 Watts.
 - Channel 3 would use only the Vehicle Repeater, the common setup for most users

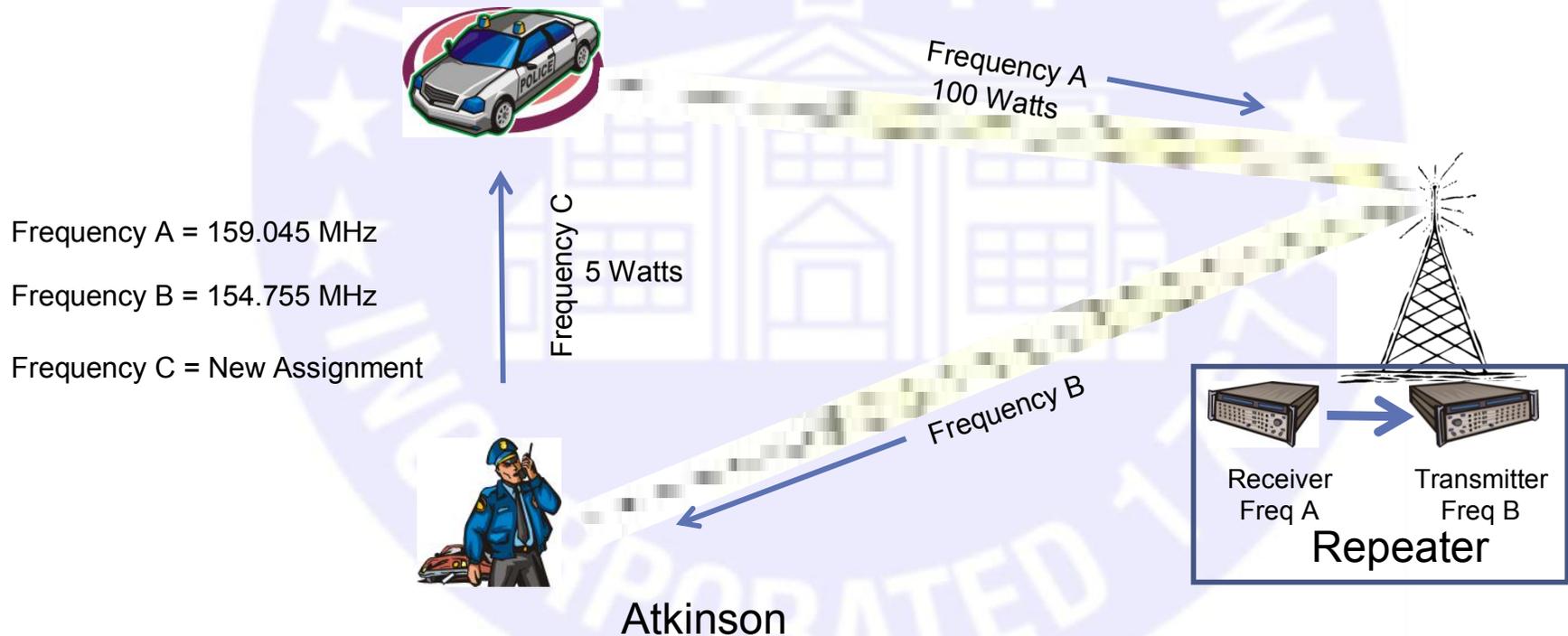
Vehicle Repeaters – Cont.

Channel 1 – The Current Setup



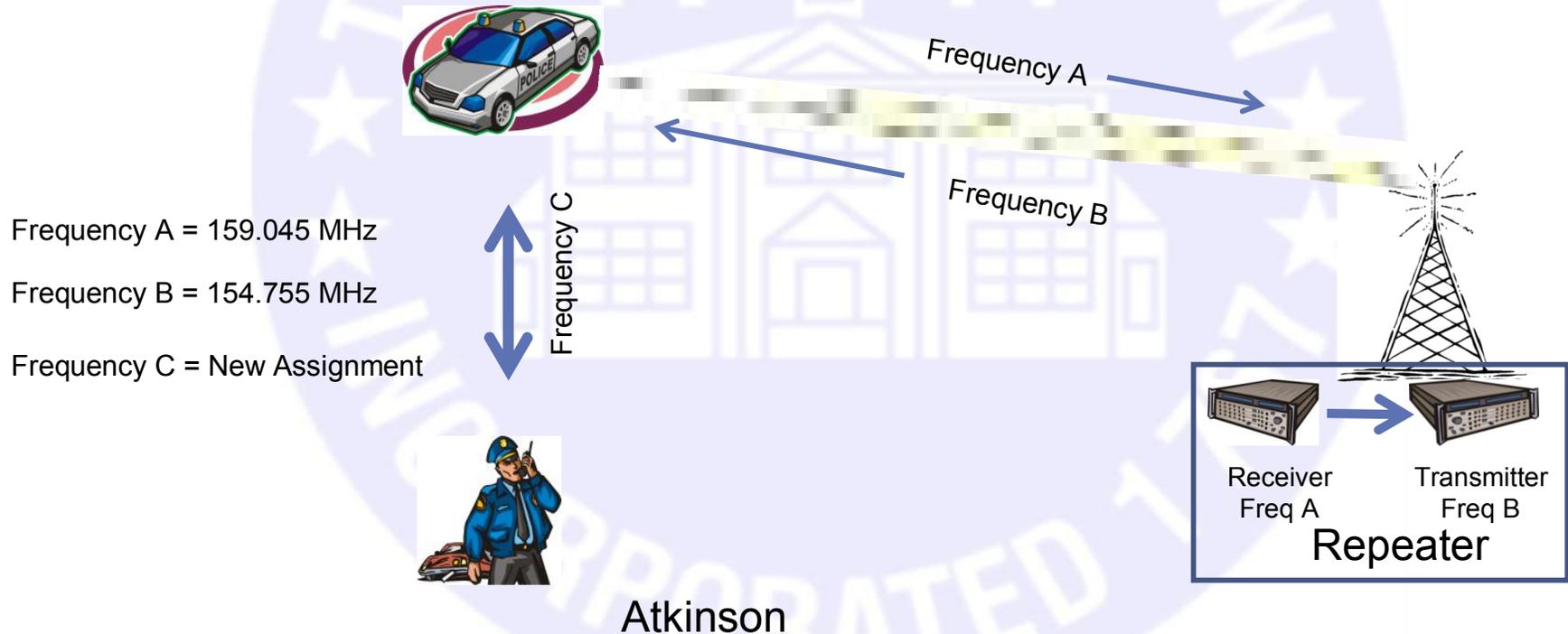
Vehicle Repeaters – Cont.

Channel 2 – Hybrid Mode



Vehicle Repeaters – Cont.

Channel 3 – Vehicle Repeater Mode



Vehicle Repeaters – Cont.

- The advantage of this new scheme is that the user can be on either Channel 1 or 2 and always hear Plaistow Dispatch
- With Channel 2 the user would not hear the priority resolution operation
 - No action is needed by the officer when other vehicles are in the area. It is all automatically sorted out and transparent to the user.
- With Channel 3 the user always has the option of using the vehicle repeater only

Advantages and Disadvantages

Satellite Receiver

- Advantages
 - The user does not have to do anything. He would operate his HT as he does today.
- Disadvantages
 - Cost. Though the cost is substantially less than the previously offered solution, it can still be considered high in these difficult economic times. Funding could be a problem.
 - The AT&T tower is ideal. However, all attempts to contact them have failed and it is possible they could refuse our request.

Advantages and Disadvantages Cont.

- There has been talk of a new tower in the area but we don't know if, when, and could we have access
- At present we know of no town owned land in the area that is useable
- Obtaining cooperation to install our equipment in Plaistow's base radios might be an issue
- Implementation will be a long term effort and will require outside project management and town oversight

Technical Team Recommendation

- Both choices are viable options
- Both Satellite Receivers and Vehicle Repeaters are in wide use so there is little technical risk with either
- The use of Vehicle Repeaters would require some training of the users but that should be minimal
- The Satellite Receiver solution is the more eloquent option requiring no user action. However, the Technical Team believes there will be many challenges to its implementation, and more significantly, feel that there is some to considerable risk that it will never be implemented

Technical Team Recommendation – Cont.

- Vehicle Repeaters, as individual units, are relatively inexpensive. You only buy as many as you need.
- Implementation is far simpler than the Satellite Receiver system. Pay the money, have them installed, train the user and the problem is resolved.
- Vehicle repeaters are a viable, proven, quick to implement, and fiscally responsible solution

Technical Team Recommendation – Cont.

The Technical Team has put considerable effort, time and thought into this project. We have not come to this decision quickly or lightly.

With all of the information obtained and summarized in this presentation, the Technical Team believes Vehicle Repeaters are the best and most viable solution for resolving the dead spot issue for Atkinson and recommends we move onto the funding phase for this recommendation.

Technical Team Recommendation – Cont.

Comment

The Technical Team has been attempting to arrange a demonstration of the SVR-250. Ossipee Mountain Electronics has informed the committee that SVR-250s' have been installed in Auburn, NH police cruisers and that they can arrange a demo upon our request. However, unless this recommendation is given serious consideration a demonstration will not be requested by the Technical Team.

We thank the Atkinson Police and Fire Departments for their cooperation and patience with our efforts.