RTCA Special Committee 186, Working Group 5
ADS-B UAT MOPS
Meeting #12

Multi-Aircraft UAT Simulation Results for Ground Receivers Using Sectorized Antennae in the Core Europe Scenario

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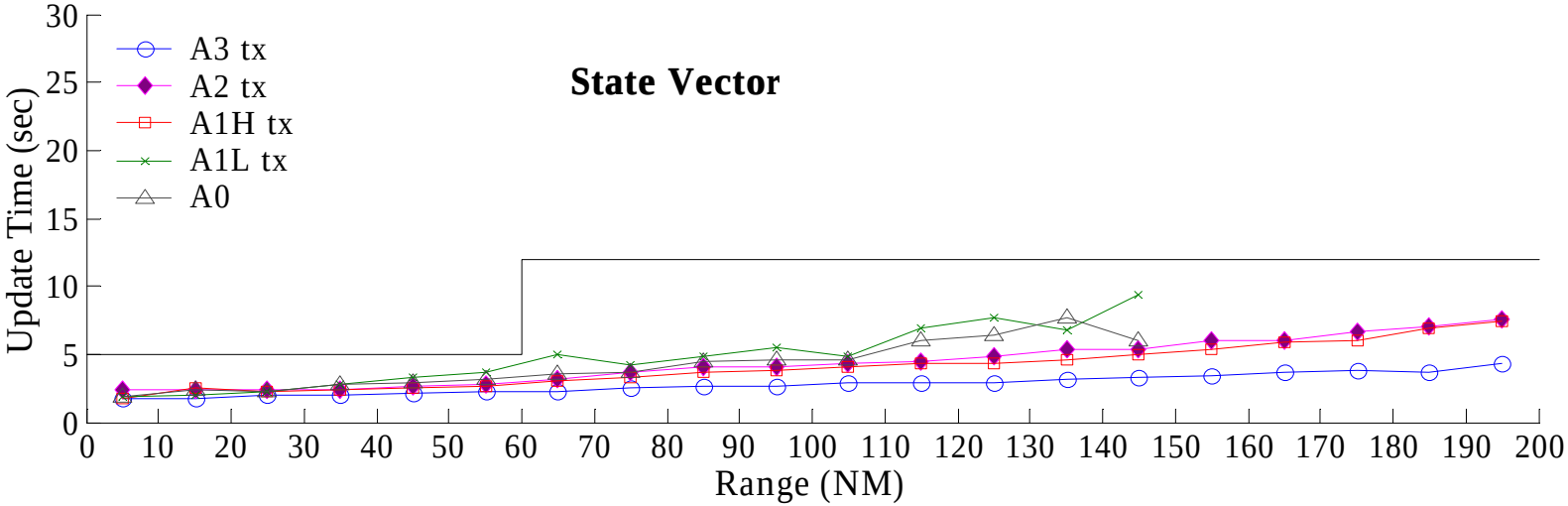
SUMMARY

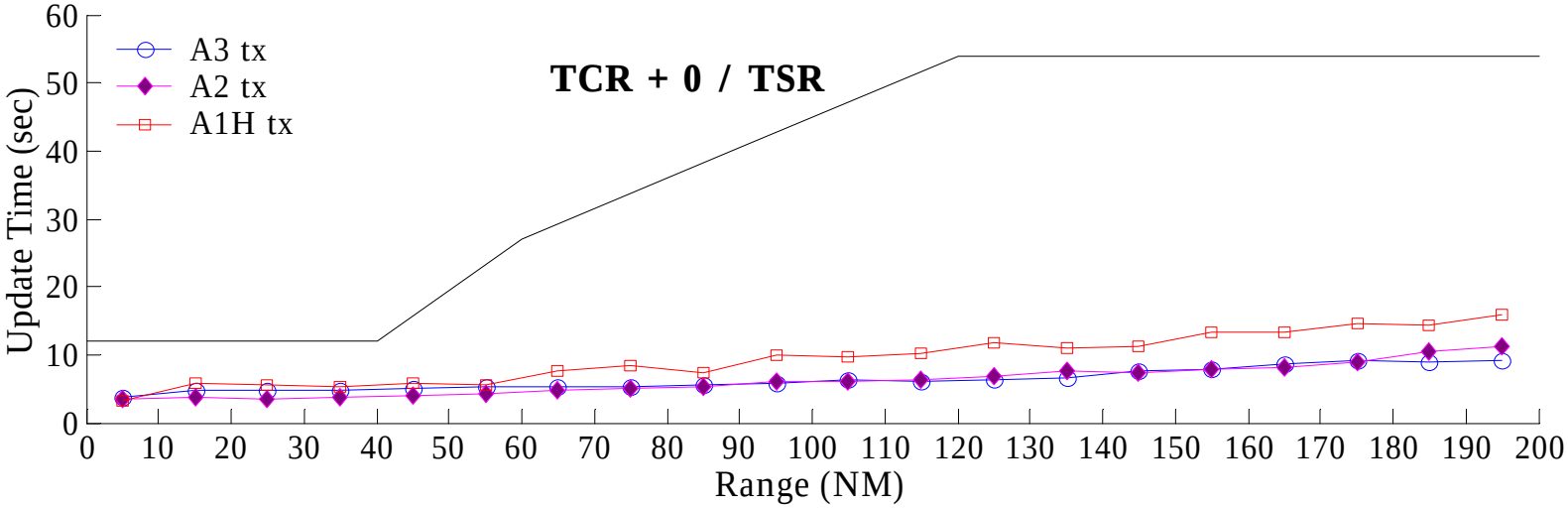
In response to Action Items 11-01 and 11-02, results from the Multi-Aircraft UAT Simulator in the Core Europe using a Sectorized Antenna are presented for review.

Assumptions

- 3 dB more sensitive (MTL = -96 dBm) than aircraft receiver
- 1.2 MHz filter
- 3-Sector Ground Antenna – outlined in UAT-WP-11-21
  - 30 dBm front-to-back isolation
  - 4.8 dB gain over omnidirectional
  - 8 dB gain TACAN antenna pattern for the elevation gain
  - Only look at “best sector” for reception (highest received desired signal level)
- Several isolation values for the TACAN transmitter
  - -10 dBm – equivalent to a 50 ft. separation for a 10 kW transmitter (could also be achieved by other means)
  - -30 dBm – equivalent to greater separation for a 10 kW transmitter or 50ft. separation from a 100 W transmitter (or other means)

Ground Receiver Update Times with no co-located TACAN

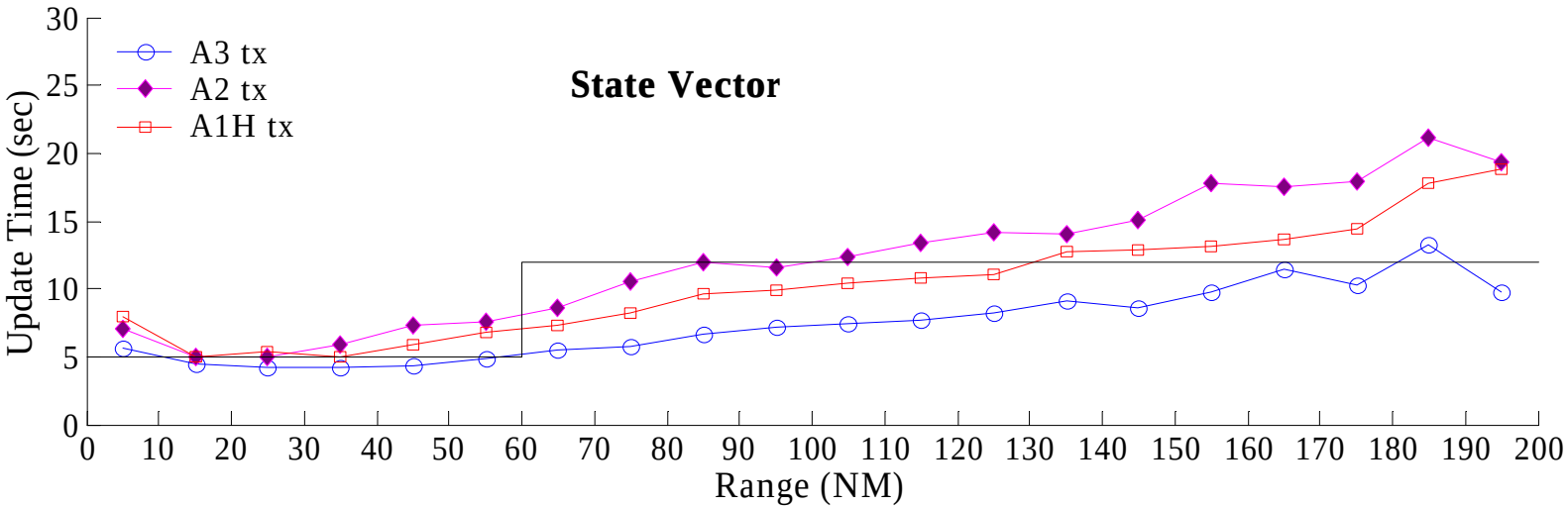


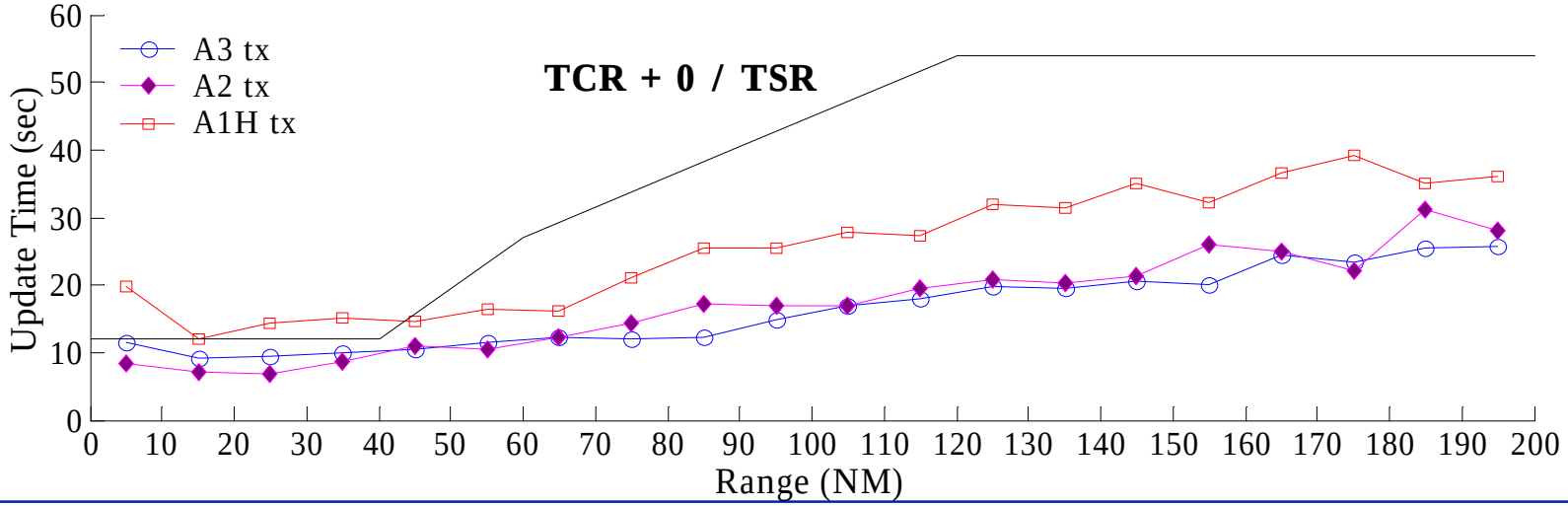


Ground Reception without Co-located TACAN Transmitter

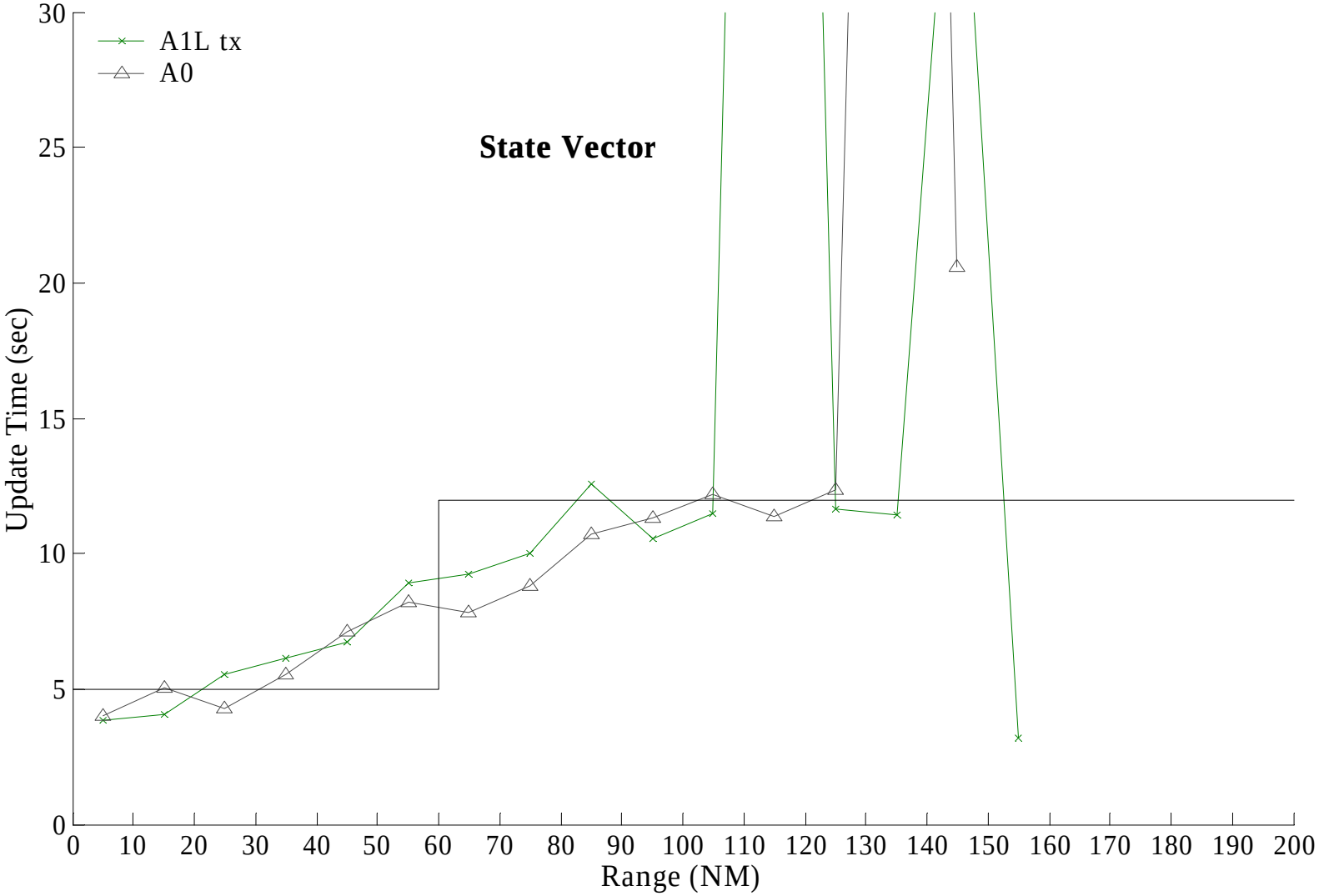
- With no co-located TACAN, ground reception requirements met to 150 NM for all ADS-B equipage types.
- Requires use of sectorized antenna.

Ground Reception with –10 dBm Co-located TACAN (A3/A2/A1H)





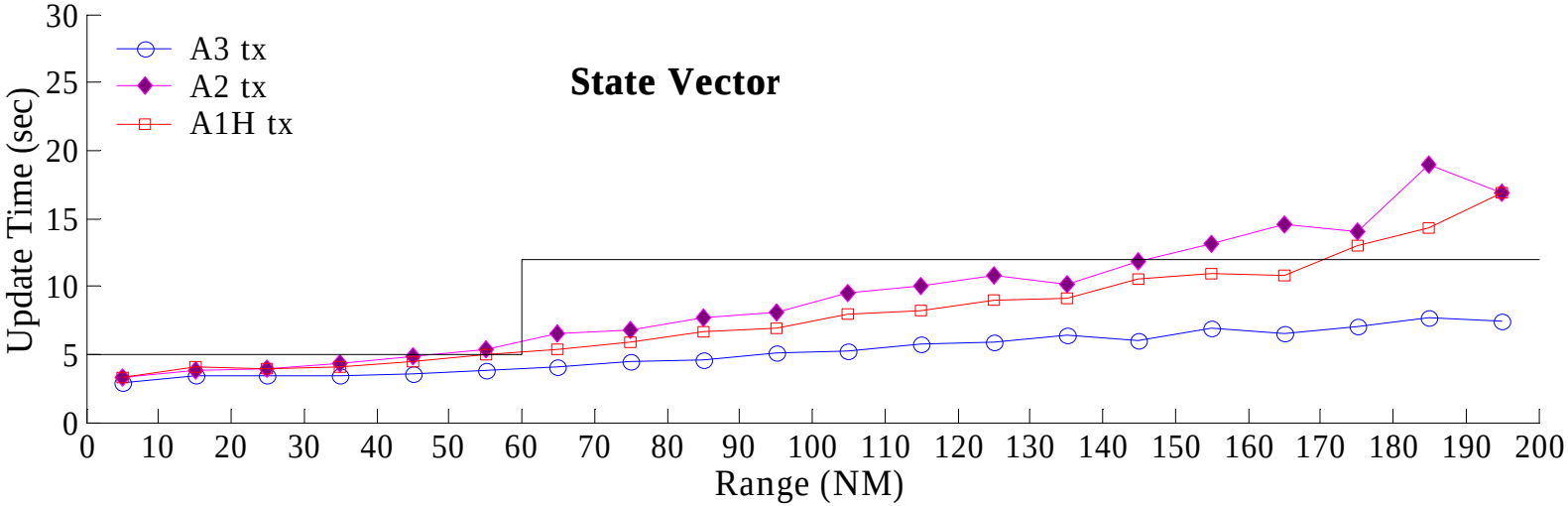
Ground Reception with –10 dBm Co-located TACAN (A1L/A0)

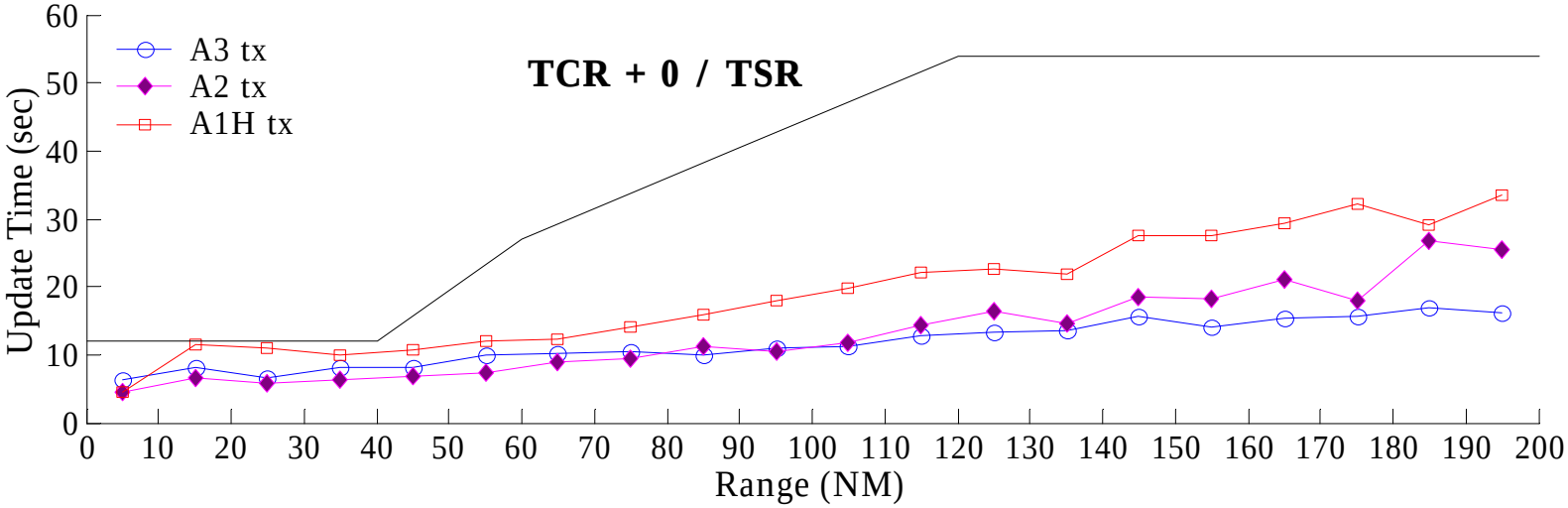


Ground Reception with –10 dBm Co-located TACAN Transmitter

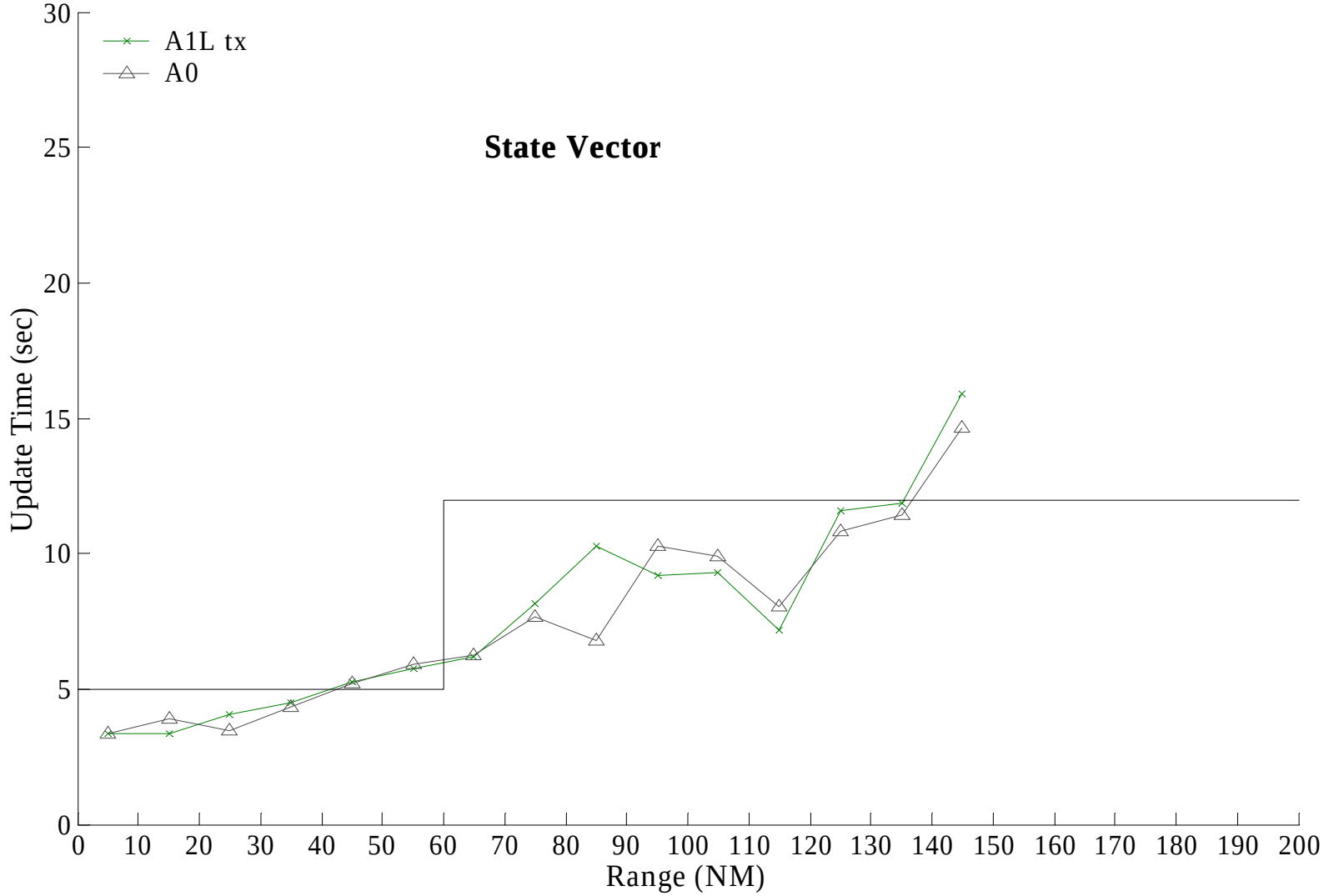
- With co-located TACAN and isolation from antenna to a level of –10 dBm, only A3 transmitters meet requirements.

Ground Reception with –30 dBm Co-located TACAN (A3/A2/A1H)

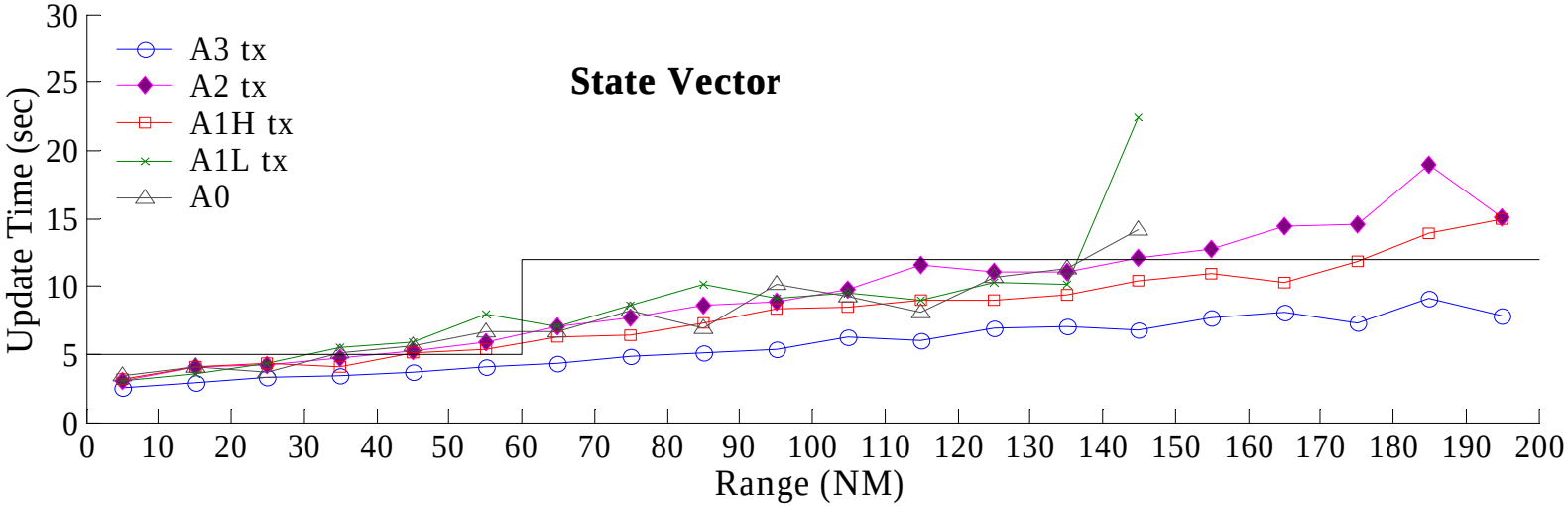


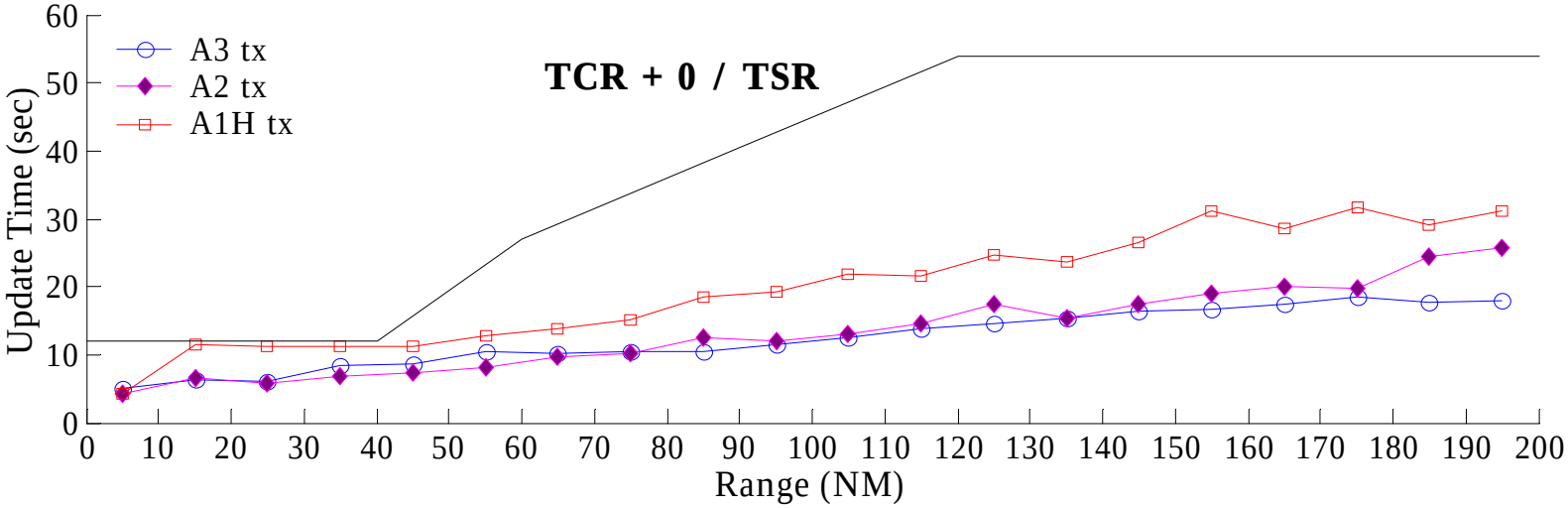


Ground Reception with –30 dBm Co-located TACAN (A1L / A0)

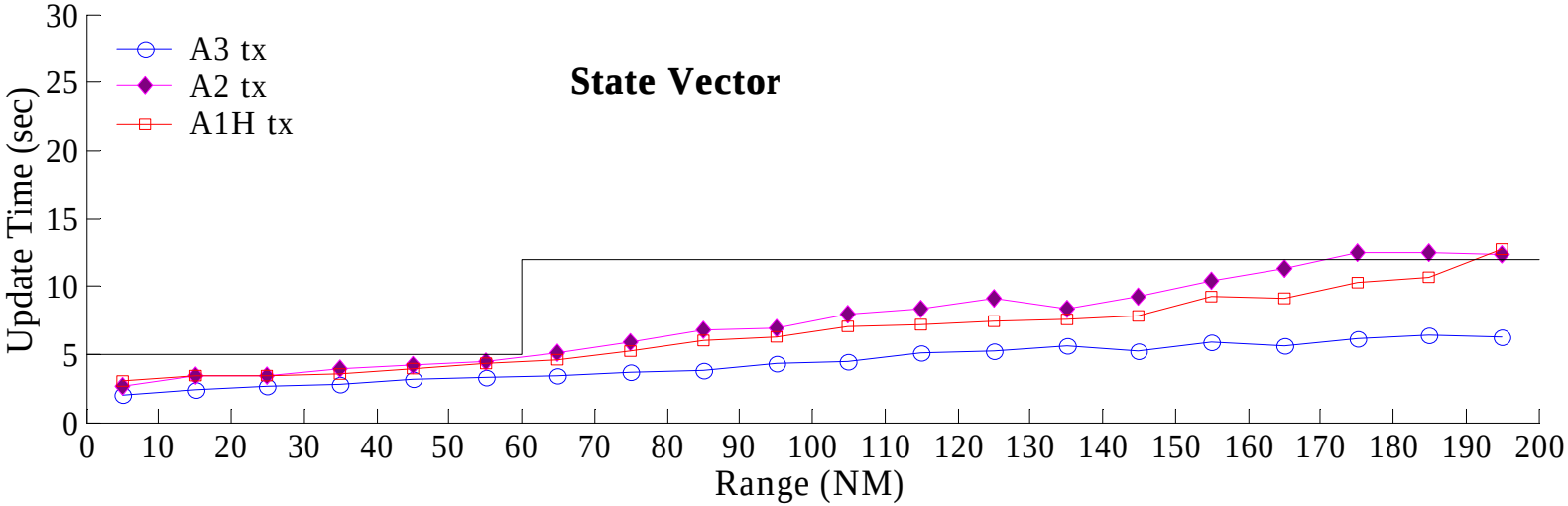


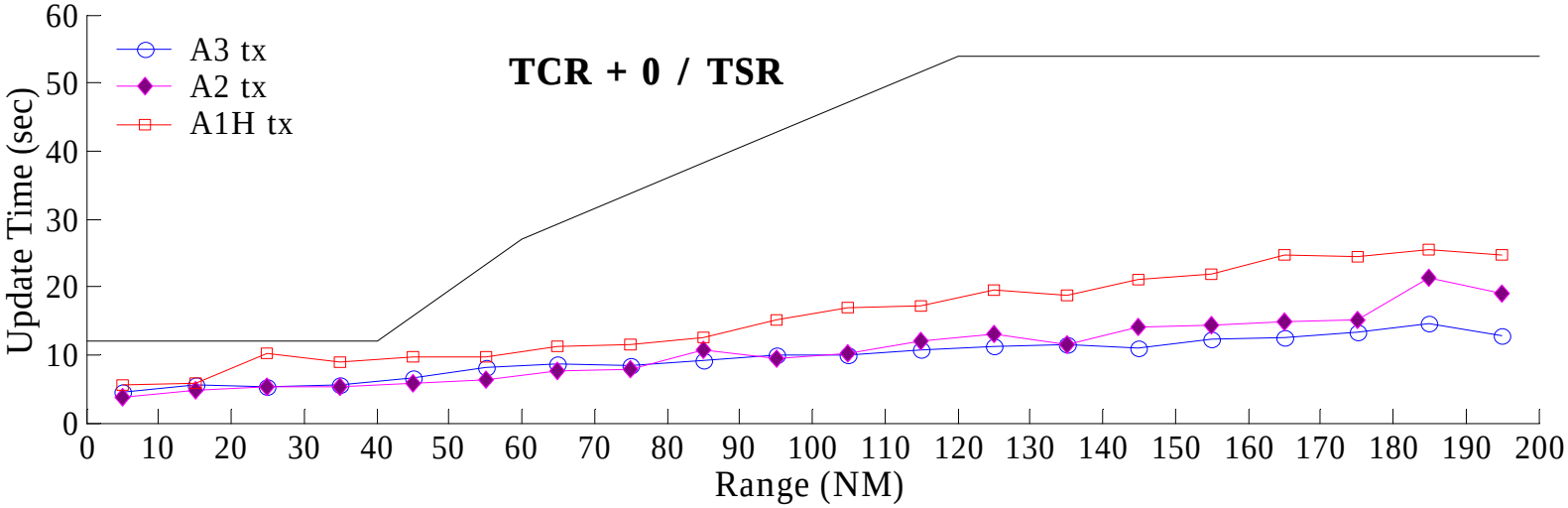
Ground Reception with 0.8 MHz filter and –30 dBm Co-located TACAN



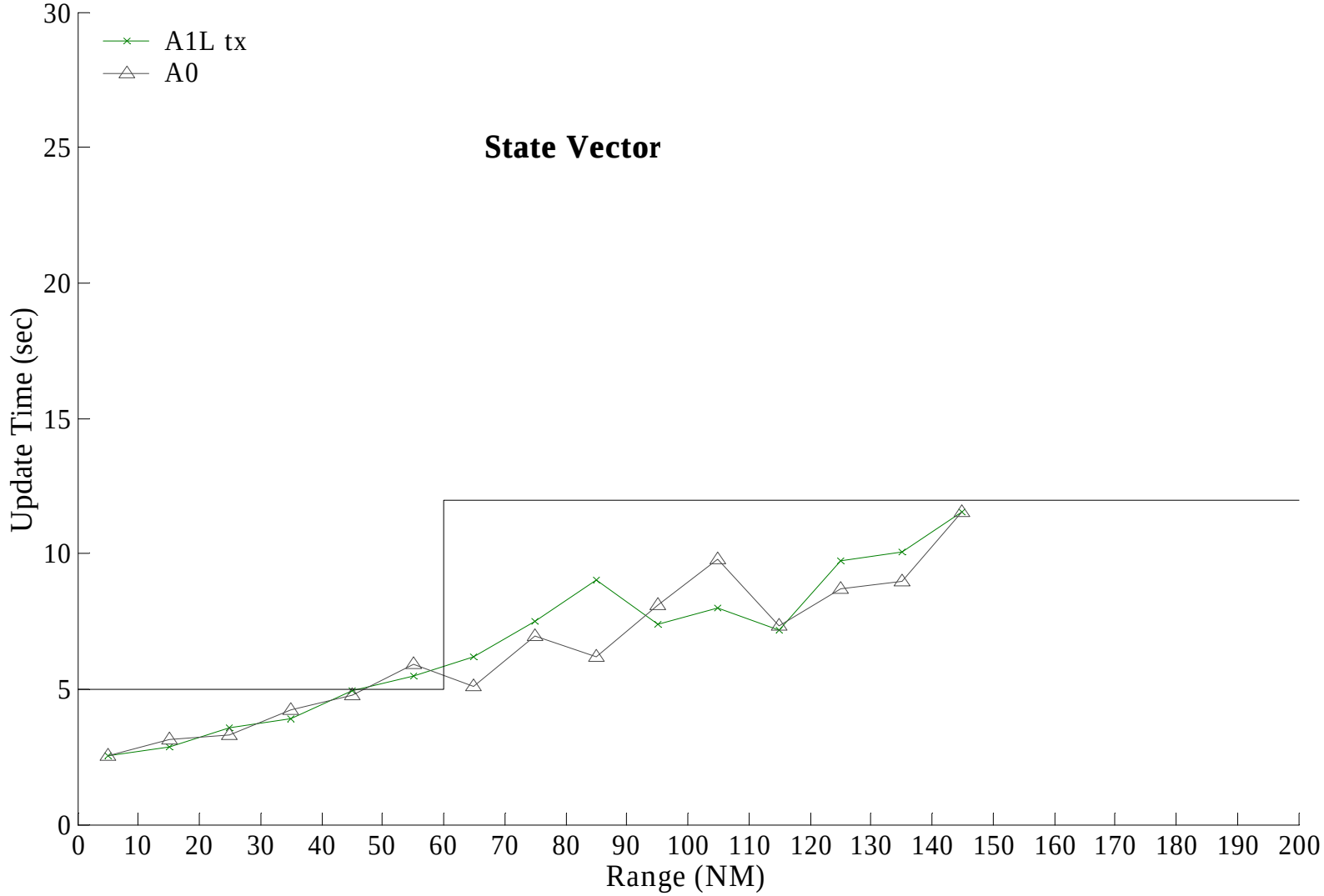


Ground Reception with –50 dBm Co-located TACAN (A3/A2/A1H)

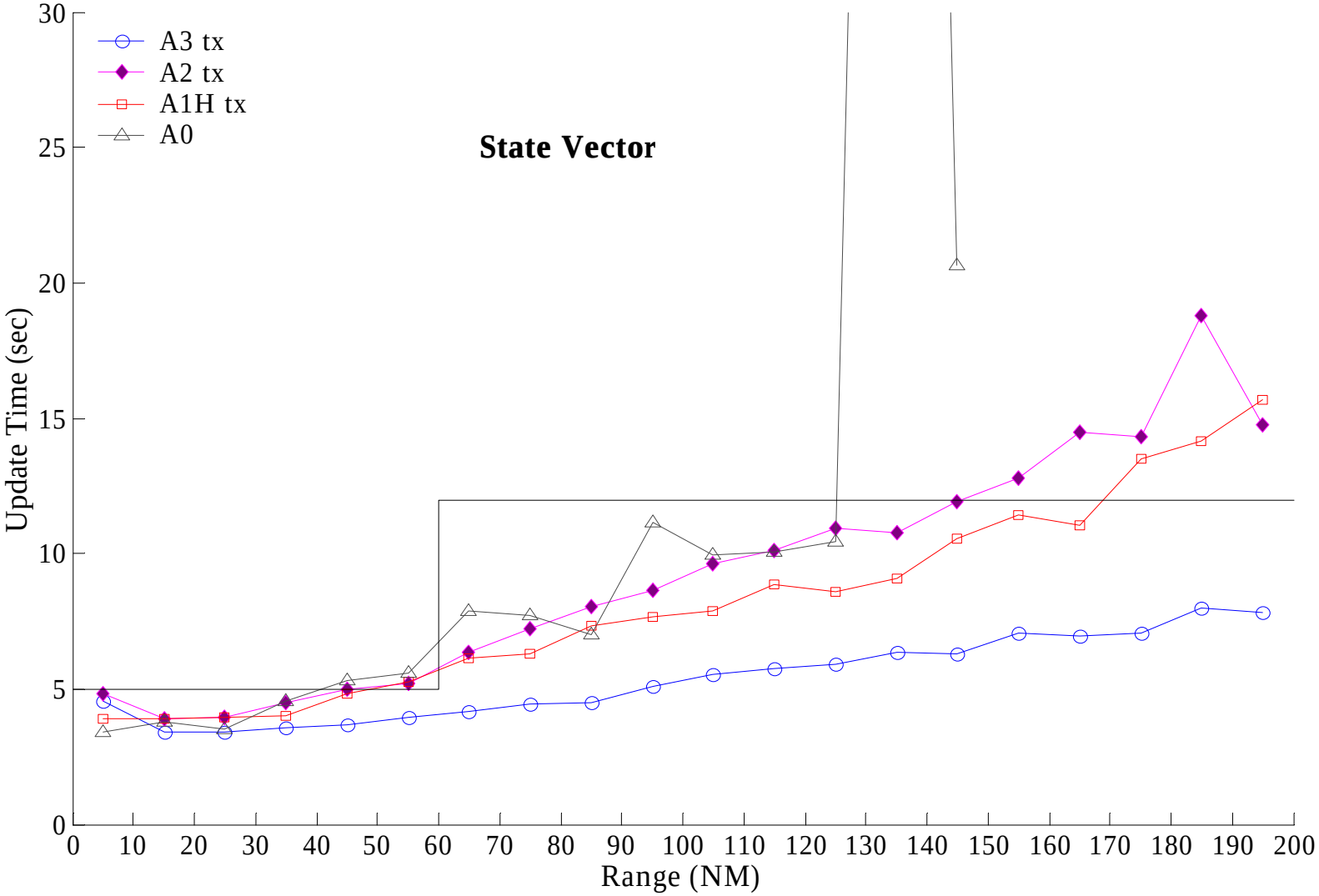




Ground Reception with –50 dBm Co-located TACAN (A1L/A0)



Ground Reception with –30 dBm Co-located TACAN (No A1L)

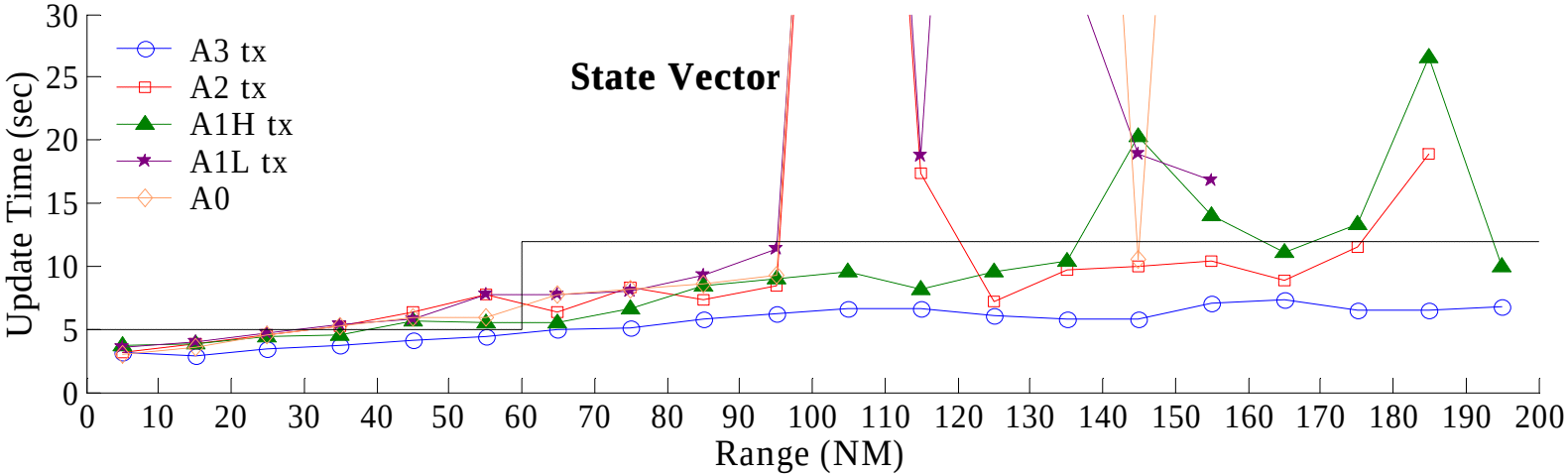
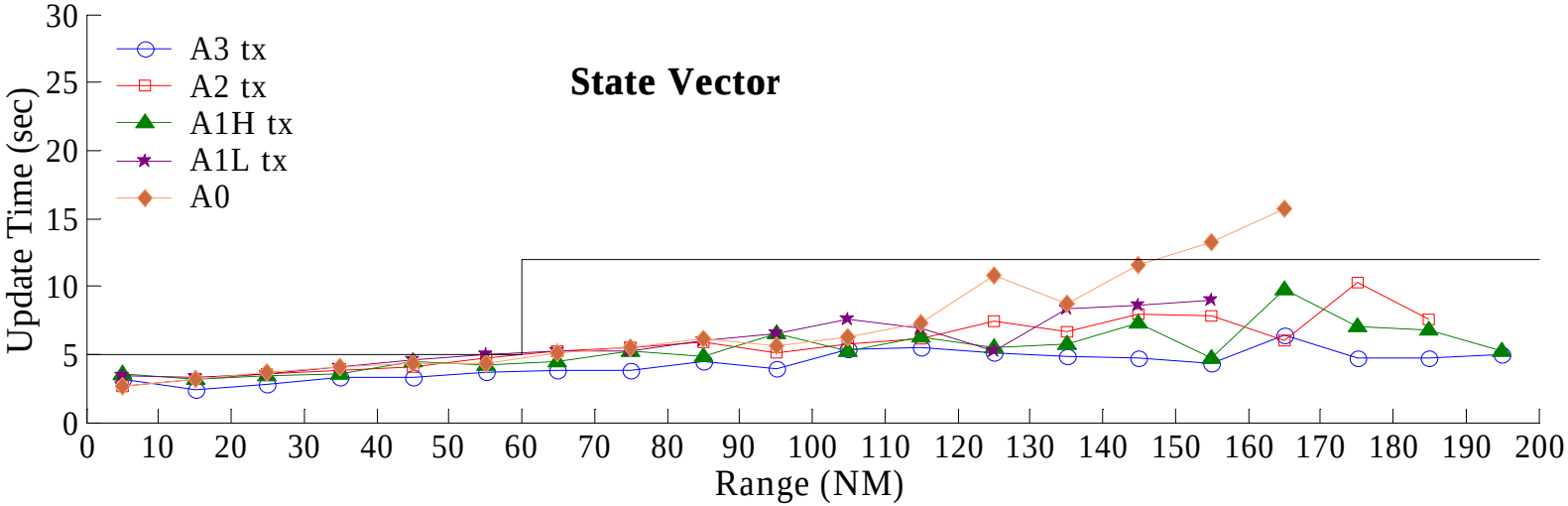
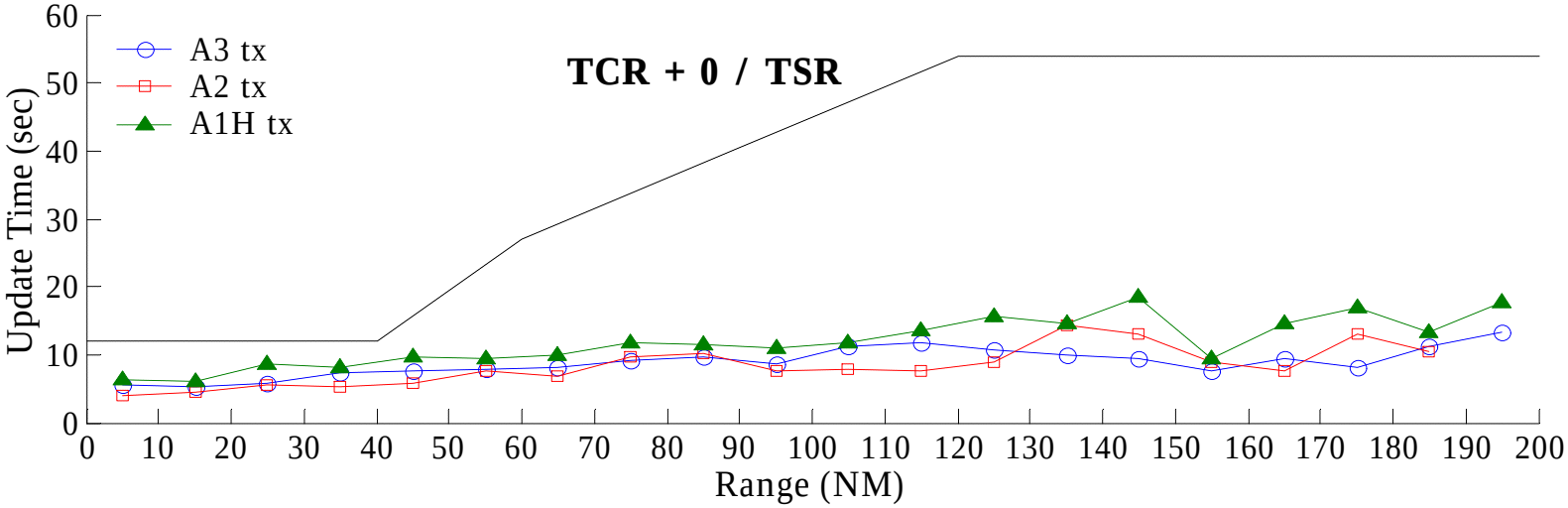


Ground Reception with Co-located TACAN Transmitter

- With co-located TACAN and isolation from antenna to a level of –30 dBm
  - A3, A2, and A1H meet ground reception requirements
    - Possible exception at step
  - A1L and A0 do not meet requirements
  - Removal of A1L results in only A0 not complying
    - Possible exception at step
- With co-located TACAN and level of –50 dBm
  - All classes meet ground reception requirements
  - Exception: step at 60 NM
- Use of 0.8 MHz filter on ground receiver does not improve reception

Standard Ground Receiver in LA with co-located 5-kW TACAN at 980 MHz

- 980 MHz TACAN simulated as a 979 MHz TACAN with 34 dB spectral loss for 1.2 MHz filter - suggestion from James Higbie
- A3 is only class to meet MASPS requirements in this situation



Sectorized Ground Antenna in LA 2020 with co-located 5-kW TACAN at 980 MHz