

Quick Repeater Update

Voting Receiver Overview

- Our FCC License provides for a SINGLE transmission location
 - However, additional *Voting Receivers* can be added to supplement receive coverage
 - Voting receivers must be connected to the repeater by a direct line-of-sight microwave link or Internet connection
 - A siren pole may be available to LARC in 2018 for a voting receiver (shared with a cellular provider).

Repeater Option #1

- Stay at Fire Station #4
 - Advantages
 - Already there
 - Disadvantages
 - Intermod Issues
 - Very limited access to the roof and antennas
 - Known RF noise sources in the area
 - Still need to run an Internet connection
 - Need to determine if microwave is possible
 - Somewhat limited RF coverage (particularly on 70cm)

- **Partial List of FS#4 Actions Taken to Date**

- A new Laird FG1443 commercial antenna and new hardline coax were purchased at time of installation.
- A Time Domain Reflectometer (TDR) was used to measure the coax up to the antennas. The coax was found to be within specification. The TDR also showed no upslope indicative of a lossy condition or water intrusion.
- Lightning discharge units were removed from the antenna line, with no improvement.
- The separate UHF antenna coax was shorted, the UHF equipment was powered off, and the UHF antennas disconnected with no improvement.
- All existing antenna connections on the roof, and metal fixtures on the roof of the building were tightened.
- All connections and grounding straps within the radio cabinet were reviewed.
- All commercial and city radio equipment at the location were disconnected from antennas, and powered off. No improvement.
- Several RFI surveys of the area were performed surrounding the site. A directional yagi antenna found noise on the north side of the fire station roof when intermod occurs (presumably a primary or secondary cause of the intermod). A second strong noise source exists in the building about a block away on the northwest corner of Main and Hwy 66.
- An RFI survey was done inside the fire station building. Every room of the building was checked using portable receivers while intermod was occurring and no obvious emitting source was identified.
- The 2M repeater was reprogrammed to use two separate tones for transmit and receive. This did not remove the intermod.
- A 12db attenuator was added inline with the antenna. This appeared to reduce, but not remove the intermod.
- A small mag mount antenna next to the equipment cabinet was substituted for the antenna on the roof and the noise went away (suggesting that the problem is not the equipment in the cabinet).
- Doug Sharpe (responsible for many repeaters in the Colorado area) performed diagnostic tests on the repeater with a system monitor. An Iso-Tee into a dummy load was connected and a weak signal deviated 3khz with a 1khz tone inserted until the squelch broke. No significant desense was found, suggesting the repeater was operating within normal bounds.

Repeater Option #2

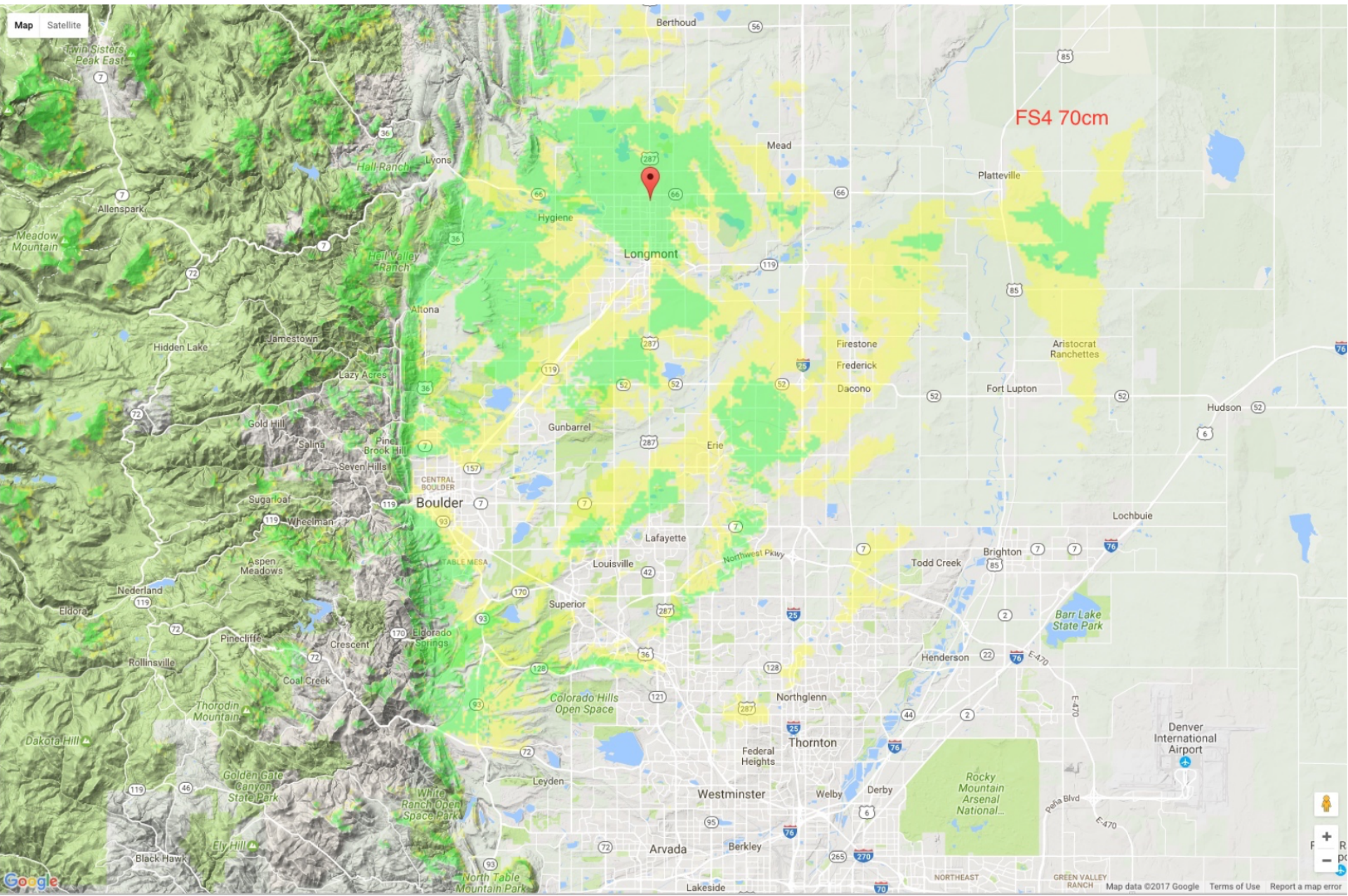
- Move Repeater to Longmont Justice Center
 - Advantages
 - A secure location and access to the roof
 - Immediate proximity to the Longmont EOC
 - Provides foundation for additional equipment (microwave...)
 - Can move at any time
 - Disadvantages
 - Historically thought to be in an RF 'hole'
 - Simulated coverage has been run, appears to be better than FS#4
 - Need to move equipment
 - Status
 - Need to test actual **TRANSMISSION** range from building
 - Verify microwave line-of-sight

Possible Repeater Option #3

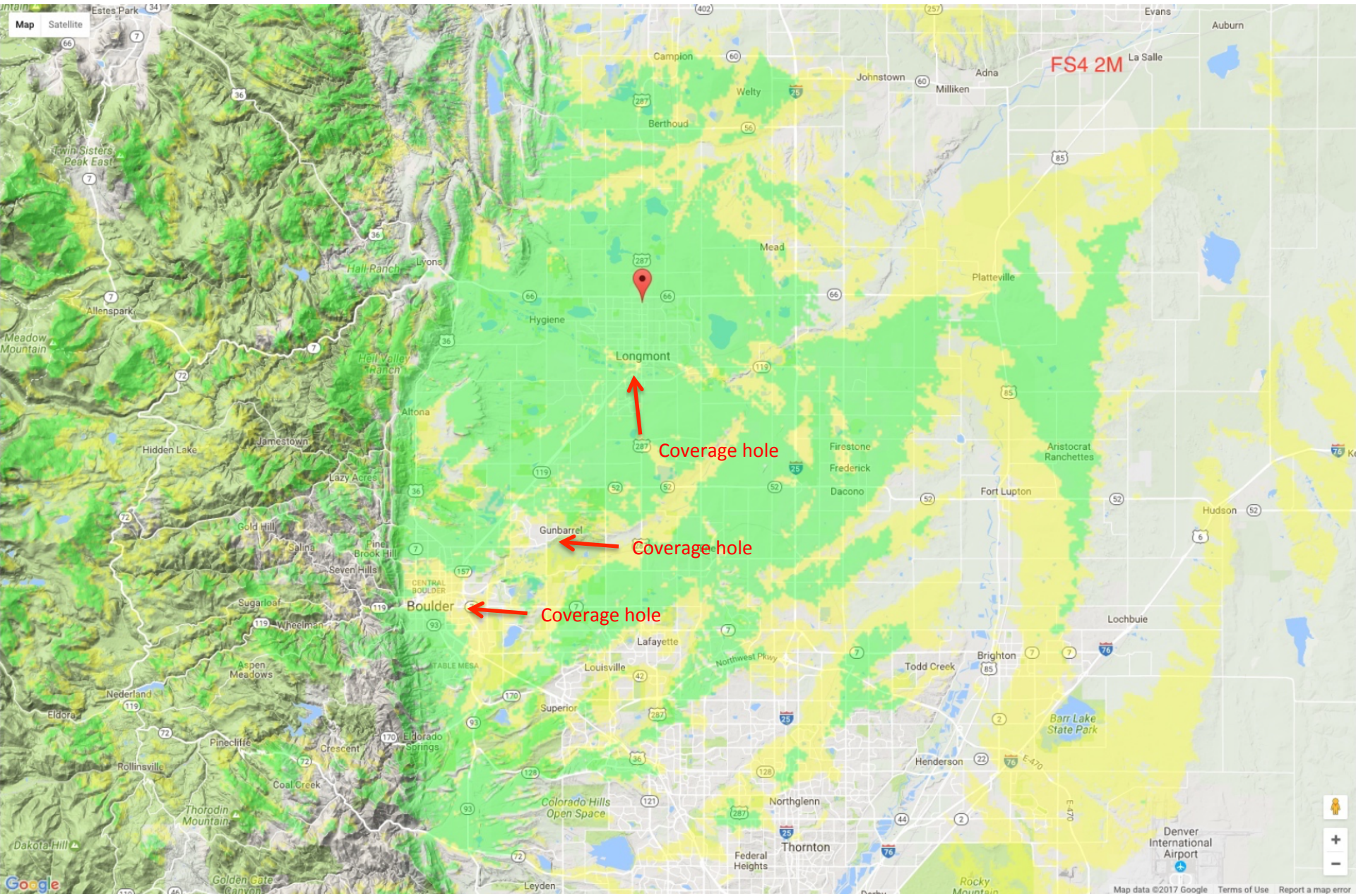
- Move Repeater to new Hospital (Hwy 119 and County Line)
 - Advantages
 - Appears to have excellent RF coverage of the area
 - Disadvantages
 - We may not be provided authorization to the site
 - Access would not be available for months (if at all)
 - Need to move equipment
 - Status
 - Simulated coverage has been run
 - Attempt to obtain authorization

Possible Repeater Option #4

- Move Repeater to an undetermined location...



FS4 70cm

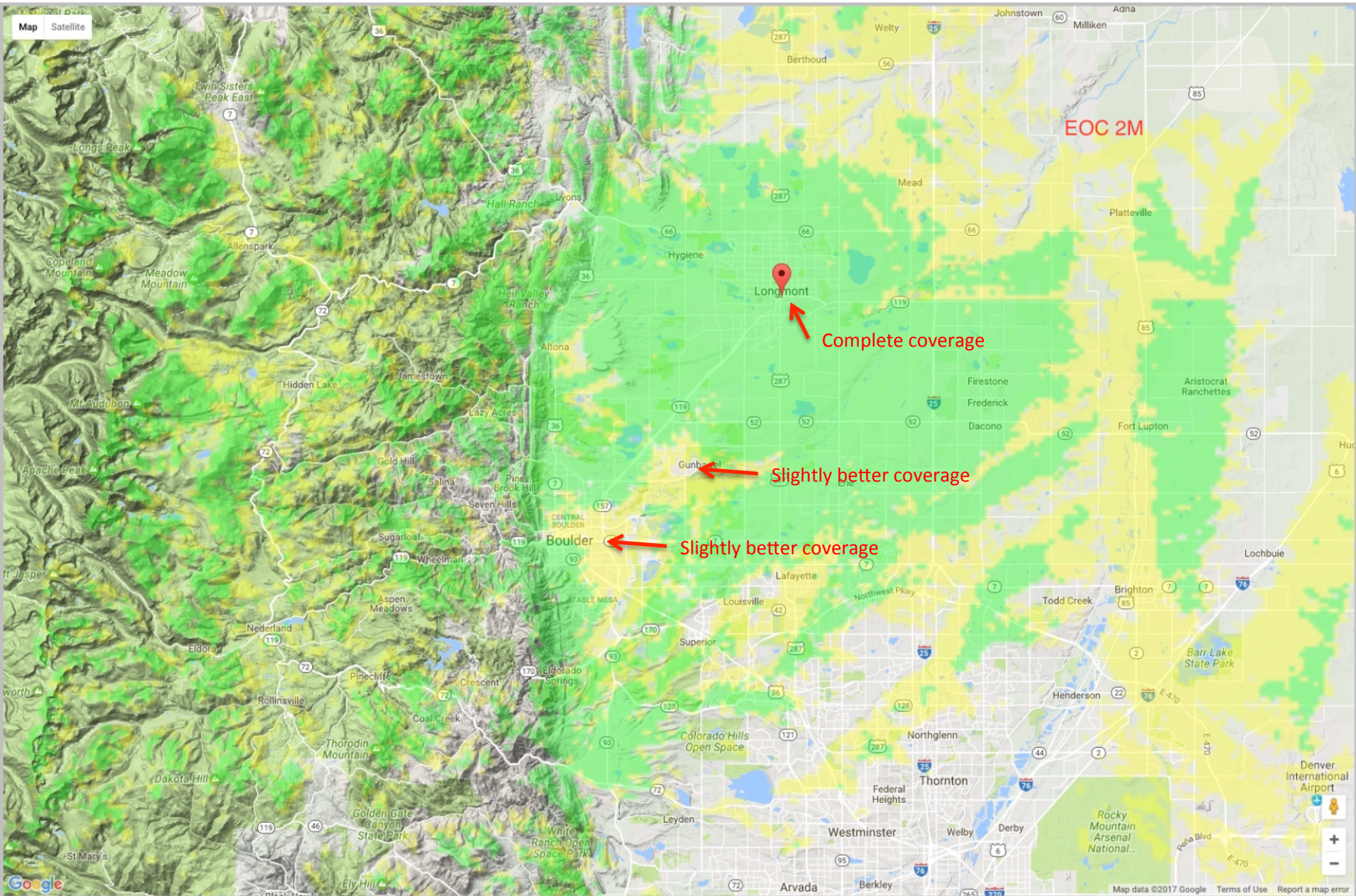


FS4 2M

Coverage hole

Coverage hole

Coverage hole



EOC 2M

Longmont

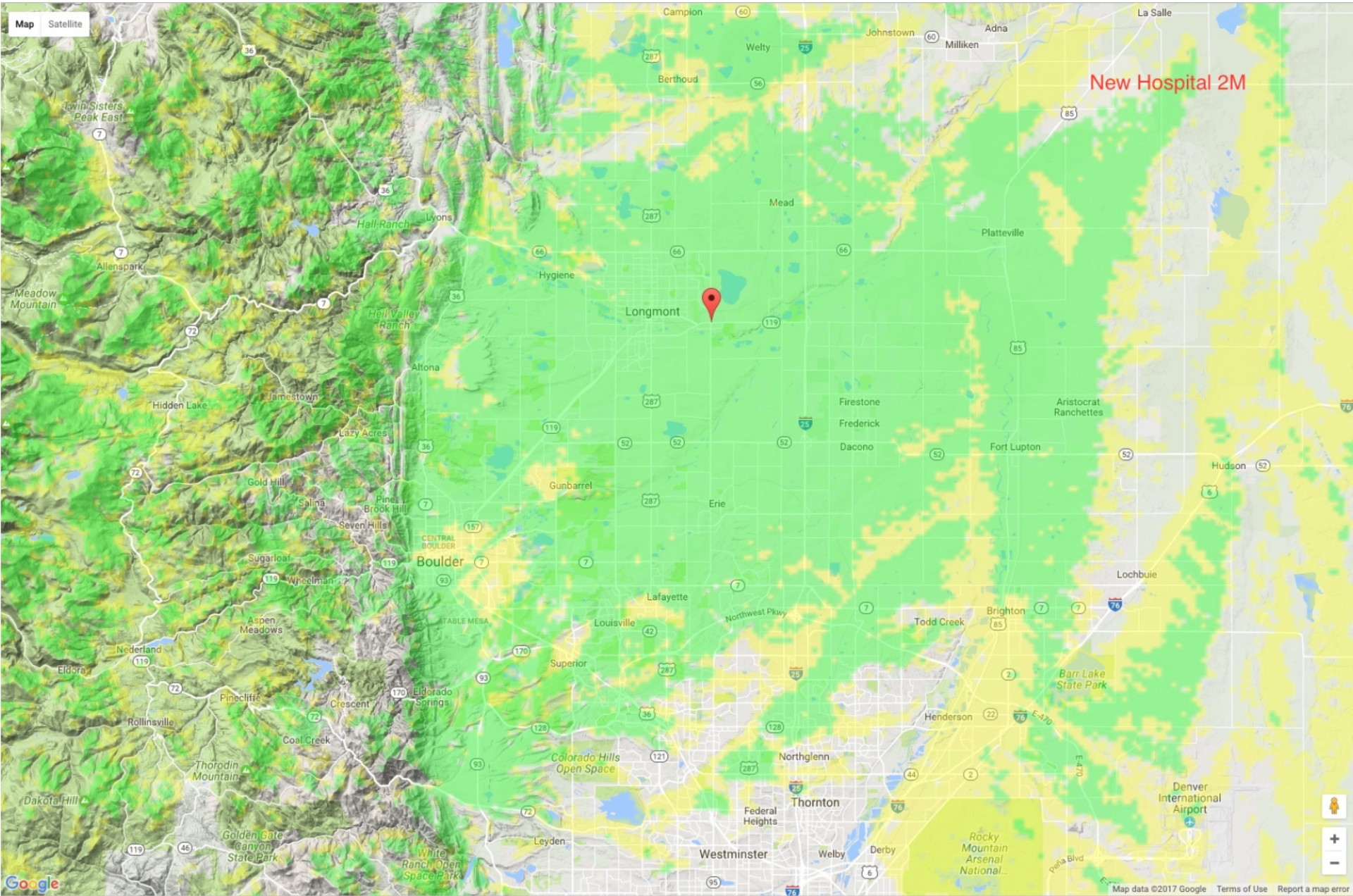
Complete coverage

Gunboat

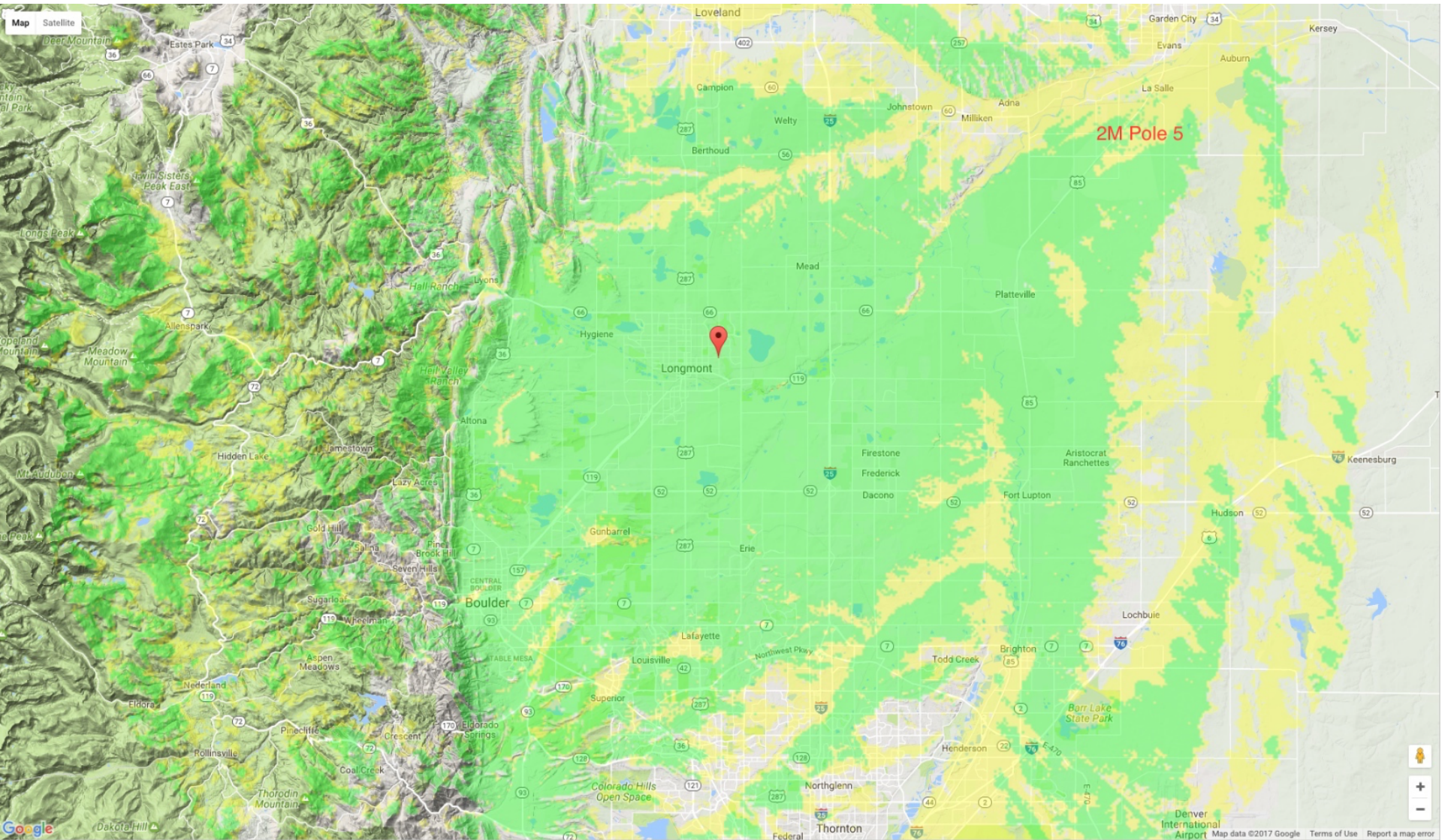
Slightly better coverage

Boulder

Slightly better coverage



New Hospital 2M



2M Pole 5

Longmont

Boulder

Upcoming Testing

- Test TRANSMISSION coverage from Longmont Justice Center
 - Will bring radio and antenna to top of building
 - We need volunteers to report coverage at various locations
 - Will use simplex frequencies on UHF and VHF