First Mesh Deployment
The Cupertino ARES at the SO Heroes Run
7 November 2015

1. Introduction

On Saturday, 7 November 2015, Cupertino ARES activated under CUP-15-24T to support the Santa Clara County Sheriff's Heroes Run, a 5K fundraiser that supports the Santa Clara Valley Medical Center Pediatrics unit. Over 800 participants signed up to run the streets of Cupertino, and CARES was invited back to provide radio coverage over the length of the course. This event was also the chance to put a mesh network deployment to the test.

An event After Action Report is being developed to address the Event in general. This particular report describes our Mesh deployment, what we did, what we found, and what we learned.

2. The Event Mesh Setup

With 2 Mesh networking classes under our belt, CARES folks interested in supporting a Mesh deployment came out two days before the event to do a pilot setup. Our intent was to do a test of at least one webcam and 3 VoIP telephones to support the event.
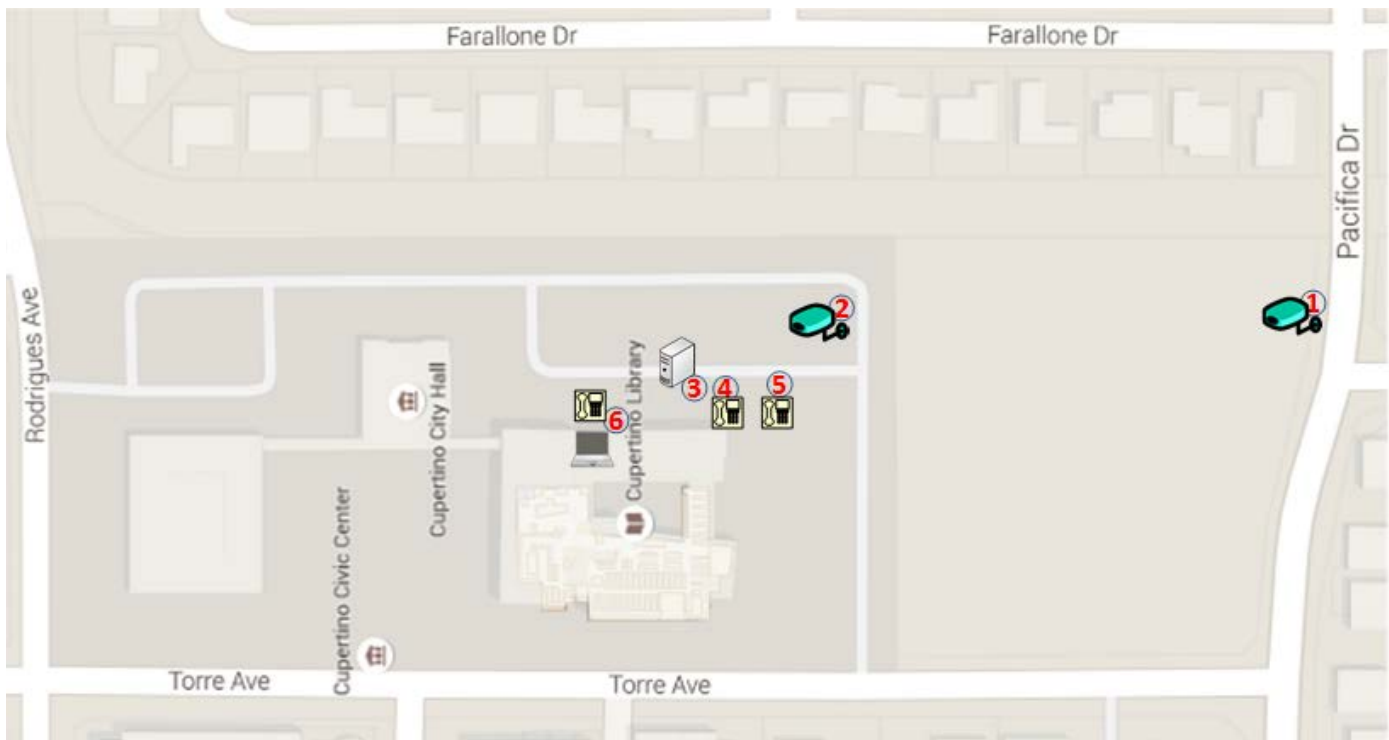
We determined that 6 stations would be used for this deployment.
- Station 1: Pacifica near Whitney Way. NanoLocoM2 and Webcam on the street
- Station 2: South East Library parking lot. BulletM2 and Webcam on the event
- Station 3: Library parking lot, NCS. Linksys and Asterisk Server
- Station 4: Library parking lot, NCS. Linksys and Telephone
- Station 5: Library parking lot, First Aid. Linksys and Telephone
- Station 6: Library parking lot, Sheriff's Command Van. Linksys, Telephone, Laptop

Station #1. Judy KK6EWQ deployed a Ubiquiti NanoStation Loco M2 at the most distant point pointing back to Station #2. Station #1 also had a Wanview camera attached to the mast, both powered from the 12v 12Ah gell cell in the box at the base. The radio and camera were mounted about 9 feet above the ground which was perfect in allowing both devices to clear the trees for both transmitting and viewing.


A 12vdc 12Ah battery is located in the box at the base of the mast. The box also holds the POE injector for the Ubiquiti as well as the 12vdc to 5vdc adaptor for the camera.

Station #2. Doug's KJ6LLY station provided central site coverage for the event. He deployed a Ubiquiti Bullet M2 into a 4 ft Ventev 12DBi Omni Antenna mounted 18ft above the ground. Doug also had a webcam configured into his package and positioned just below the trees to view the starting/finish line.

Doug standing by the mast strapped to an enclusure with the webcam mounted just above his head. A power supply box (not shown) also holds the POE injector for the Ubiquiti as well as the 12vdc to 5vdc adaptor for the camera.

Station #3. Jim KN6PE brought his server to support the phone network with 5 phones ultimately being turned on. This station -- a linksys router, Zultys ZIP2 phone, Dell Netbook running Ubuntu and Asterisk, and a 12vdc 12 Ah gell cell -- was pulled out of the box, powered up, and then we all got distracted with the event… it never left the spot shown here. Once the phones were deployed, they all were tested, their extensions recorded, and 3 "post-it directories" were created and distributed.
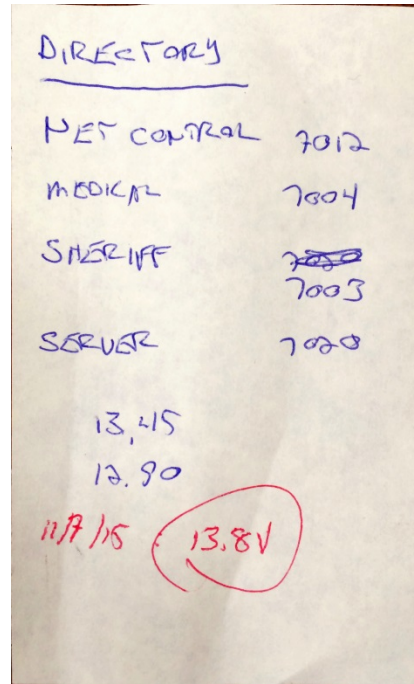
The Linksys, phone battery, and server/laptop all fit into the red box shown here.

Station 4: Skip WA6VFD deployed a telephone kit at the Net Control Station, and this node was NOT going to run out of battery power.   Along with the linksys router and Zultys ZIP2 phone, his kit included a 75Ah Interstate battery with Coleman 400W/800W surge power inverter to power his setup.
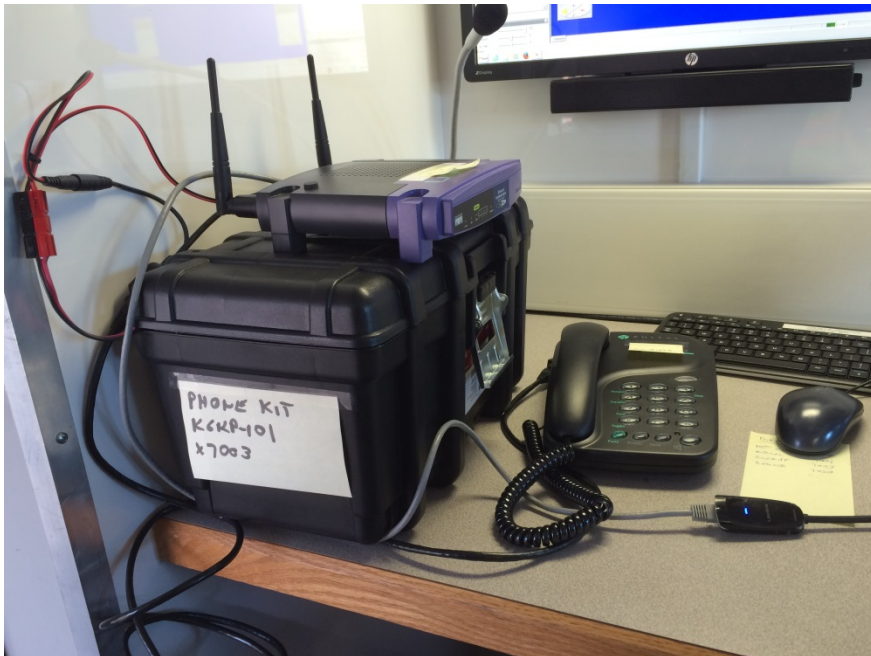

Skip's 75 Ah battery sitting on a the luggage cart next to the inverter.

Station #5: Jim KN6PE deployed a telephone kit to the first aid station. It included a linksys router, Zultys ZIP2 phone, and 7Ah gell cell.

Station #6. This station was identical to Station #5 and deployed at the Sheriff's Command Vehicle with the addition of a laptop to access the web cameras.

3. Findings / Observations
The following are the team's observations from this deployment:

Setup
1. The test setup performed 2 days prior to the event gave us the practice and insight on how and where to install the nodes.
2. The team had different types of system packaging. Some members expressed a desire to repackage the power supplies into a more water resistant box.
3. Using yellow caution tape would help protect the area where equipment was set up (we had it on Saturday, but ran out of time to use it).

Power
4. The power problems we encountered with the 5vdc webcam points to the need to revisit how power is delivered to these low voltage devices.
5. The 750Wh capacity of battery and inverter was overkill for this event but will prove invaluable for an extended operational period.

Operation
6. Some of the phone users reported that it was too noisy to use the phone at the NCS and the First Aid Station (Public Address system, DJ, crowd noise). We should think about the likely amount of ambient noise if/when we really want to use a particular phone.
7. From inside the sheriff's command post, Station #6 (Linksys) probably had at least 1 hop to Station #2 and 2 hops to Station #1.
8. With both webcams in different browser windows, video received at Station #6 from camera #1 (Station #1, 2 hops) was more choppy then from camera #2 (Station #2, 1 hop). Take a look at this link of the PC with both cameras streaming … http://www.cupertinoares.org/video/SOFR-Video-Perf.mp4.
9. Both cameras had controls for both the pan and tilt from the laptop; there was no zoom capability on each. Response delays with making changes frequently resulted in over-shooting the desired location to view.

4. Recommendations
The following recommendations are made:

1. Webcam power. Move the power module from the battery box to next to the camera. This allows 12vdc into a passive POE cable to be sent from the battery to the power module at the camera. Investigate the use of Tubson TH15W2405S, 12vdc IN, 5vdc 3A out.
2. Develop a plan to test video reception over a different number of nodes and number of cameras to evaluate video chop.
3. Hold a session on mesh packaging and power options for field mesh deployments.