



# Interference Issues Update

December 2022



# Agenda

- Interference Introduction
- FCC Field Visit
- Interference efforts since FCC visit
- Mitigation & Containment efforts
- Threat & Opportunities
- Communication Plan







# Interference Introduction

July to October 2022



# Interference Introduction

- Washoe County Regional Communication System (WCRCRS) is experiencing Interference on the Washoe County Simulcast System (WC Metro: Red Peak and Peavine Peak)
  - General and constant “noise” or static in certain parts of the service area
    - This interference degrades the quality of communications. This noise can be heard in 10-20% of all communications.
  - Intermittent bursts of interference in certain parts of the service area
    - This interference impacts a broad spectrum of Radio Frequency users including AM & FM Radio bands, 500MHz, 700MHz, 800MHz, and 900MHz Equipment.
    - This interference is not always present but when it occurs, it completely blocks communication.
    - This primarily occurs in the area of downtown Reno, north to Parr Blvd.
- The Interference is not just affecting public safety but the RF community as a whole. Affecting the Community as a whole from 88.1MHz- 900MHz





# Things we had done prior to FCC

- Complete Channel by Channel Radio Assessment
- Complete a Simulcast Re-alignment
- Drive test looking for spurious signals with a spectrum analyzer, unable to locate interference signal
- Hire RF Engineer to conduct a Simulcast RE-alignment
- By-pass receiver multi-coupler
- By-pass Tower Top Amplifier (TTA)
- By-pass Power Amplifier (Inside PA)
- Physically visit the Interference areas to conduct Channel by Channel Assessment
- Created Public Safety Radio Interference Committee with PSAP's to try and solve Interference issues
- Create Interference Map for drive testing and isolation of Interference
- Began investigating rogue BDA's (August - now)



# FCC Field Visit

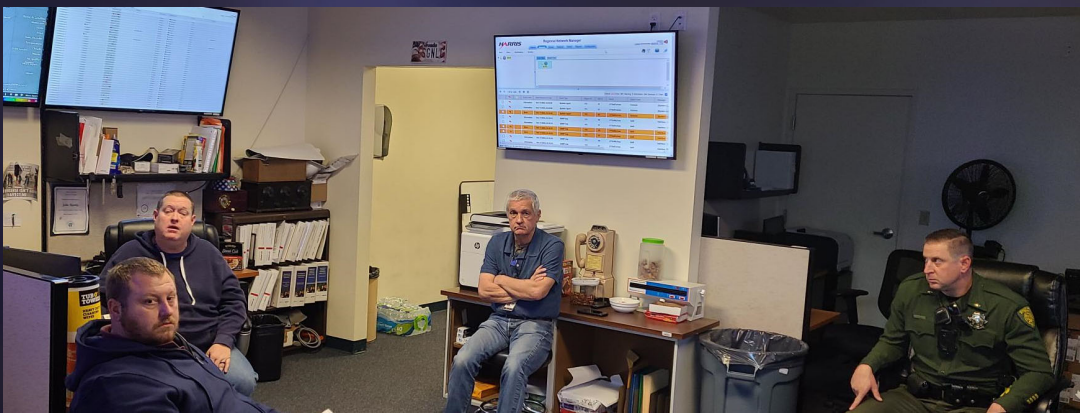
October / November 2022





# FCC Field Visit

- Possible suspects that were discussed included:
  - Radar Equipment / GPS Jamming equipment
  - BDA's and amplifiers at Schools and Warehouses
  - Solar Panels, and their auto transfer / power converters
  - Hospital Paging equipment
  - WaterTank Monitoring Equipment





# FCC Field Visit

- Drive in Washoe County Truck with FCC Field Equipment included the following Drive path:
  - Edison to McCarran to Pyramid Highway
  - Spanish Springs Industrial Park (Footlocker Warehouse)
  - Weather Doppler at Virginia Peak NOAA
  - HWY 447/446 Nixon/Wadsworth Solar Panels
  - I-80 Solar panels on Waltham Lane (Apple I Cloud)
  - I-80 Mustang Lane Scanell Building/ FedEX building
  - Veteran's Memorial Highway to South Reno DMV (BDA)





# FCC Field Visit

- Drive in FCC Vehicle:
  - Mill Past Airport
  - Renown Medical Center
  - Riverside & 1st Street to South Virginia (Casino Corridor)
  - AT&T Communication Building
  - 2nd Street Reno Police Precinct
  - Renown Medical
  - 580 Hwy to Clear Acres
  - Sun Valley Blvd (Under Red Peak)
  - Highland Drive to Pyramid Lake Highway
  - Bohach Elementary & Sky Ranch Middle School 1200 Windmill Farms Pkwy



# Agencies Investigated during FCC Visit

- TMWA Water Tanks
- Weather Radar on Virginia Peak
- Airport Radar
- National Guard assets @ airport
- Broadcaster (Both TV and Radio)
- St. Mary's Hospital
- Renown Medical Center







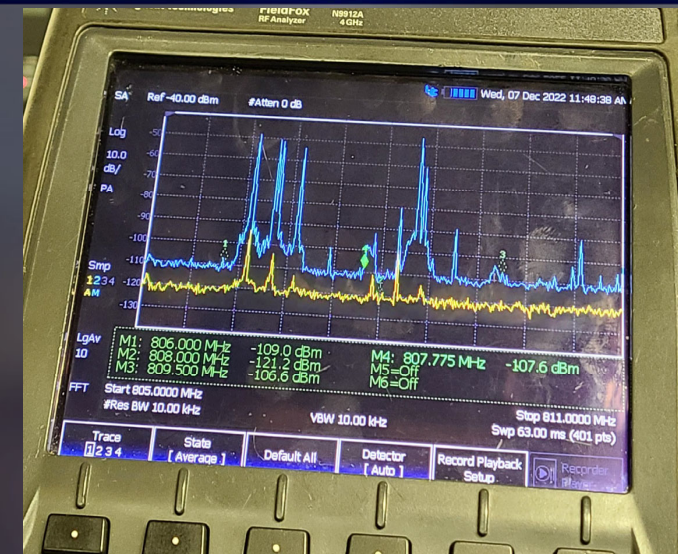
# Interference efforts since FCC visit

November December



# Things we have done

- Visit all "Known" BDA or inbuilding Amplifier systems, over 30+ sites visited.
  - Found 11 Sites requiring major adjustments.
  - Turned-off sites
  - Fixed or reconfigured sites with system's we are familiar with
  - Contacted Day wireless for Newer Comba BDA's, Called Collins Telecom for TX/RX BDA systems for any system that was in oscillations or that we couldn't identify the issue for.
- Used Ultrasonic noise finder @ Red Peak to rule out the following:
  - Electrical Pole Leakage
  - Impulse sounds/ Intermodulation running along fences and within the building or building at Red Peak
- Physically inspected all Antenna's connectors and feedlines for P25 System, and EDACS system at Red peak (Peavine is next to be completed)

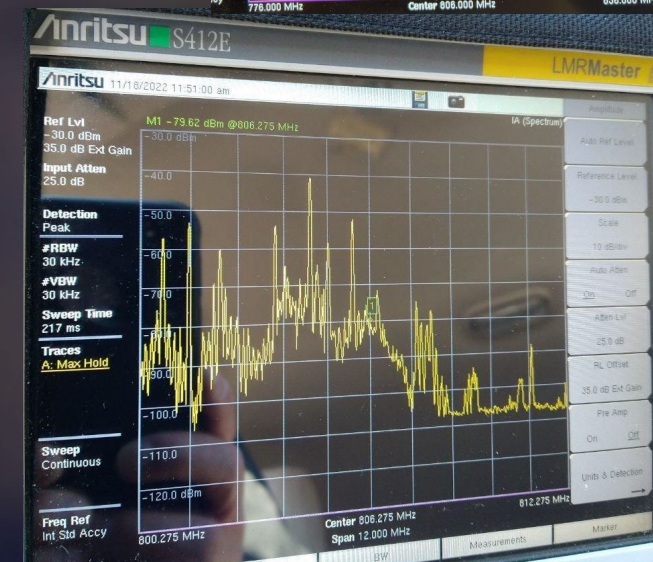
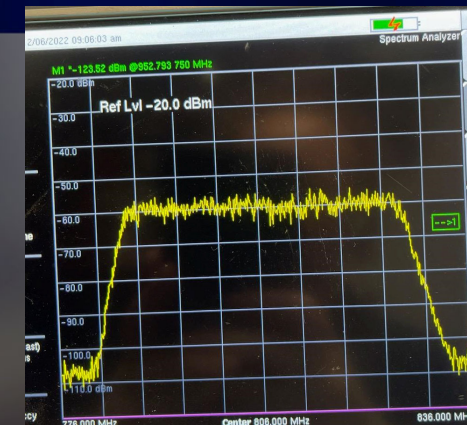






# Interference efforts since FCC visit

- Community Effort (Impacting the community as a whole)
  - Radio Broadcasters (Music radio Stations)
  - Amateur Radio folks
  - Schools/University (School of Engineering)
  - FCC/NRPC
- Hired RF Engineer to assist in all efforts
- Hired Tower Crew for Antenna Investigation
- Hire Pericle Communications to assist in finding the interference
- 31 BDA's visited
  - 11 of BDA's Turned off
  - 6 of BDA's Fixed
  - 4 awaiting re-certification
- Following BDA were adding to the noise:
  - Jail (Fixed) Washoe County\*
  - Jan Evan Juvenile Facility (Fixed) Washoe County\*
  - Mendive (Fixed & needs to be certified) WCSD
  - Bohach (Been sent back to the manufacturer- completely broke) WCSD
  - Sky Ranch (Fixed) WCSD
  - Galena (Needs repair and certification) WCSD
  - HUG (Fixed) WCSD
  - Reid (Fixed) WCSD
  - McQueen (Fixed) WCSD
  - South Reno DMV (DEM Customer-NDOT)
  - Mustang Lane (Commercial Building)







## Interference efforts since FCC visit cont.

- FCC Continues to research various Equipment vendors
  - Looking at Leaky Electrical Poles near repeater sites
  - Researching the cellular companies in the area
- Reached out to National Regional Planning Committee for 700MHz & 800MHz to discuss interference experienced throughout the United States
  - Found various states experienced major issues with Comba BDAs
  - Found that some states are refusing any BDA that isn't a Class A Amplifier, Due to "oscillation" issues that occur 1 year after install.
  - Received testing policies and guides to add to our own system documents and RFP documentation



# Path forward

- Path Forward Includes a lot of researching and gathering of information relative to the area
- Conduct PIM Test, and Antenna System characterization on both Peavine and Red Peak.
- Completely turning off Red Peak to see if the interference is at the Red Peak Compound. Since this is a simulcast system- Peavine would pick up the traffic.
- Investigate cradle points, and cellular modems within vehicles to determine if maintenance is necessary on these devices, and if the intermodulation is coming from one of these devices.
- Investigate all New builds from June 2021 to now
  - Verify any BDA or in-building antenna system that are older than a year
  - See if there are antenna's on building we are unaware of
- Pull all new FCC Applications and installations within the Area
  - Verify all frequencies of Cellular carriers
  - First Net installations
  - New Internet Service Providers (ISP) Manually look for Unlicensed Microwave systems.
- Investigate 3<sup>rd</sup> order harmonics (how to find a Unicorn)



# Collins Telecommunications

- Experience:
  - Established 1992- Collins Telecommunications has been instrumental in the implementation of many business, industrial, utility, and public safety communications systems.
  - Collins Telecom is recognized as a leader in the two-way land mobile field-engineering sector. Our specialty pertains to the design, installation and maintenance of two-way trunked radio systems, P25, OpenSky , microwave transport and Conventional systems. Highly recommended and used among the Nevada Shared Radio System (NSRS) Partners.
- Plan:
  - Conduct a Full RFI report for Red Peak
  - **Recreate the signal on single Radio and go RFI Hunting\*\*\***
  - Continue to troubleshoot and Assist with Identifying rogue BDA and in-building amplifier systems
  - Get trained on COMBA BDA's to assist in quick repairs to the newer BDA systems being installed.





# Pericle Communication

- Experience:
  - National Engineering Firm that specializes on Radio Frequency Interference Hunting, (RFI Hunting).
  - Highly recommended by Association of Public-safety Communications Officials (APCO), National Regional Planning Committee (NRPC) & Federal Communications Commission (FCC).
  - Established 1992- Experience in both Motorola and Harris radio systems.
- Plan:
  - PIM Test- to test the Passive Intermodulation Internal to the antenna system
  - Check Transformers near (Red Peak & Peavine)-for Arching caused by oil dielectric that evaporates over time.
  - Visit area around 911 Parr & Detention center for possible Interference causes
  - Assist with Path Forward- investigations.



# Mitigation & Containment Efforts



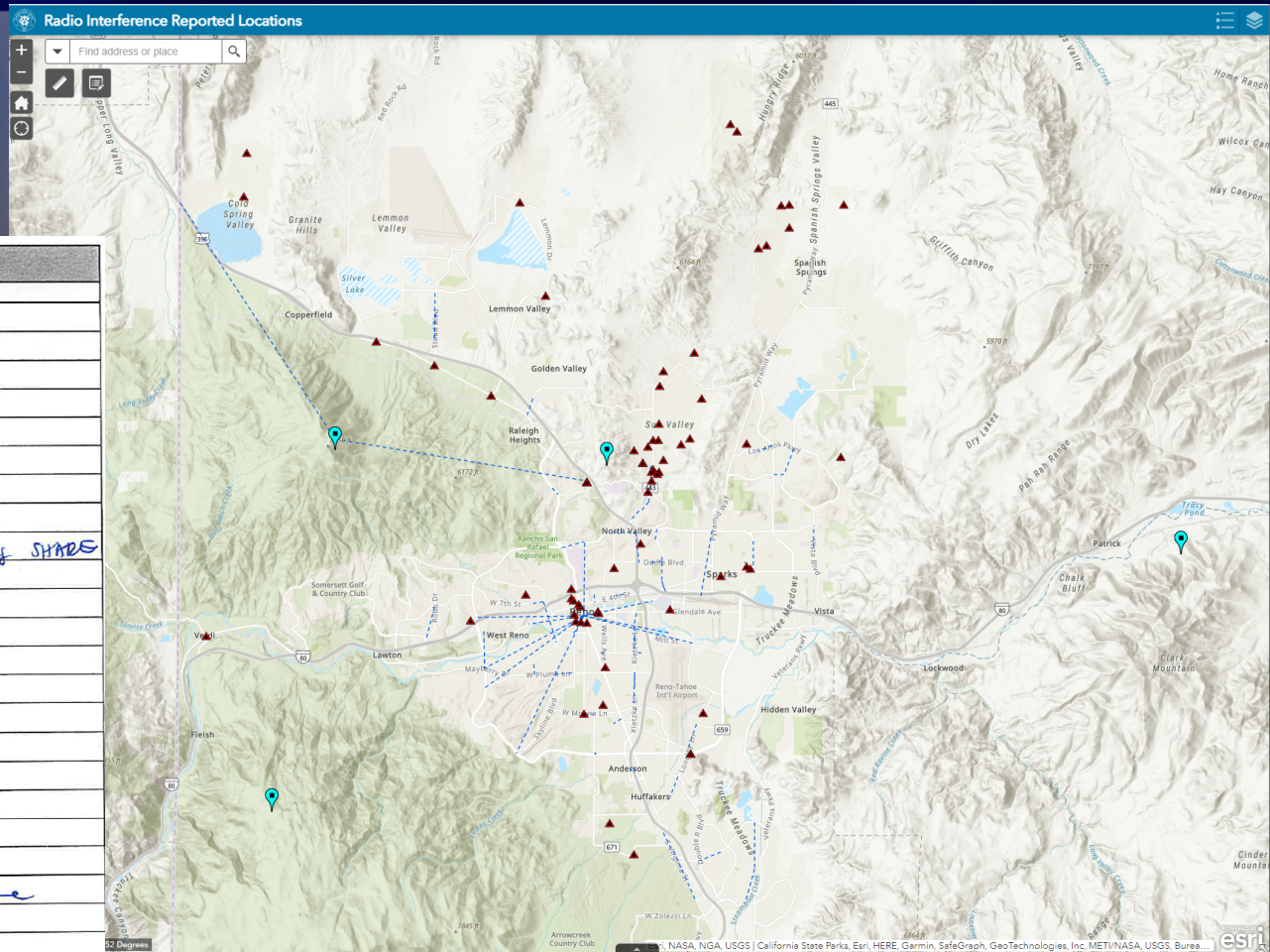
# Mitigation & Containment

- Interference Map
  - <https://washoe.maps.arcgis.com/apps/webappviewer/index.html?id=fa21cc60f115467e9462443d09f34d8c>
- Interference Application
  - In development
- BDA Registration Website (Mapping)
  - [Regional Services Dashboard \(washoecounty.us\)](https://washoecounty.us/regional-services-dashboard)
- Create County and City Policies (Eventually State Policy)
- Implement a process that falls in line with permitting
  - Meetings to start in December 2022





# Interference Map



## RADIO STATIC TRACKING

DATE/TIME	RADIO ID	REPEATER (IF POSSIBLE)	TALK GROUP
10/27	02:35:48	EDACS - RP Given	RG
10/27	02:36:23	" "	RG
10/27	02:36:41	" "	RG
10/27	04:12:34	RP Brunson-Jake	Central Sub RG
10/27	04:12:51	RP Souza-Zachary	Central Sub RG
10/27	05:34:05	RP McCauley-Patrick	Near Central Sub RG
10/27	05:34:13	" "	" RG
10/27	14:27:57	Ken-T-Wilmoth	unk RG
10/31	03:25	UNR Wasser	at unknown Pennington School Lockwood building SHARS
11/2	1455 45	RP Reidel	Kietzky/Mull RY
11/2	1802	RP Wilson, Erik	South sub RY
11/2	2206 18	RP Lamoreaux	Station RG
11/2	2205 37	wilson, erik	Peppermill RSEC
11/2	2208 55	wilson, erik	Peppermill RSEC
11/3	0734 36	RP 176325	unk RG
11/3	1607 00	Salter	station RG
11/3	1942 00	WOC 1084	unk 950 arrowcreek RY
11/3	1942 10	WOC 1084	unk 950 arrowcreek RY
11/3	2001 32	RP Grawford	unk RG
11/4	1158 00	Munn	200 E 4th St RG
11/4	1213 31	RP Triggs, Tim	RP Shre
11/4	1407 30	carney	1981 Terminal RG





# Threats & Opportunities



# Threats & Opportunities

Threats		Opportunities	
•Officer Safety Concerns			
	•Detention Center Interference concerns	•In-building system replacement (CIP)	
	•Patrol officers in the field	•XL series radio roll out	
		•continual system & end user alignment/maintenance	
•Timelines			
	•Radio System Build-out (outage length)*	• Work on creating more redundancy within system	
	•Region 2 Deployment delayed	•Provide time for JOC to find money for site builds	
	•BLM/County permitting (growth*)	•Provide time for JOC to find money for site builds	
	•\$4.2 Million Dollar Shortfall for site build out	•Site builds needed to fill Coverage Gaps	
•WCRCs has outdated equipment			
	•Need a Real-time Spectrum Analyzer		
	•Need PIM Tester		
Some Key discussions			
	•Changing Radio System vendors doesn't fix the RF Interference Issue. Same State issued frequencies assigned to the system by the FCC (700MHz & 800MHz).		
	•End User-Radio maintenance will not ELIMINATE Interference, but Maintenance is necessary to a healthy Radio System, and provides more reliability for first responders		



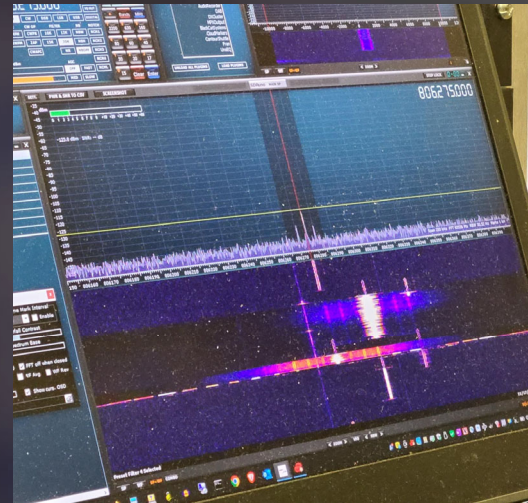


# Communication Plan



# Communication Plan

- What other ways do we need to communicate these efforts for transparency
  - Get everyone on right email distribution
  - Weekly/Bi-Weekly engagements
  - Website for Public sharable information
  - SharePoint for Internal Communications and questions
- Are there other community efforts that should be engaged?







# Questions & Concerns?

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