

TEHAMA COUNTY,
CALIFORNIA AND
TEHAMA RURAL AREA
EXPRESS (TRAX)



Tehama Rural Area eXpress

INVENTORY & NEEDS ASSESSMENT REPORT
FOR THE
INTEGRATED PUBLIC SAFETY
COMMUNICATIONS PROJECT

STATUS: FINAL

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Executive Summary

Through a series of site visits, interviews, and surveys, CDX Wireless has inventoried the existing Tehama County Radio system, specifically the two-way, voice, land mobile radio systems used by the Tehama County Sheriff's Office (TCSO), Tehama County Public Works (TCPW), and the Tehama Rural Area eXpress (TRAX). Also evaluated were the computer-based dispatch applications used by TCSO and TRAX (TCPW does not use an application for dispatch operations). These systems were assessed to understand how they are currently used as well as to identify what assets could be used, with or without improvements, for a possible replacement to those systems. This report also identifies user needs for any future upgrades or replacements to the voice radio and/or dispatch application systems.

CDX Wireless has come to understand that the overall design of the existing system grew incrementally (and without an overall/unifying architecture) to meet developing user needs. Those needs are generally met with exception to those summarized below and described in greater detail throughout this report. Additionally, the funding provided to the existing system has been sufficient to maintain its basic operations but because the systems equipment is aged and in order to address the unmet needs, upgrades to, or replacements of, the system will be required in the coming years. The associated expenses of the upgrade to or replacement of the systems will be significantly more than the historical/current levels of funding.

The major issue with the current two-way radio systems (the one that was identified by users most regularly and with the most emphasis) is that of insufficient coverage. This was reported as an issue for TCSO, TCPW, and TRAX. The TCSO radio system utilizes two radio sites, both using the same radio channel but separated in use by a technology that prevents one site from repeating radio calls received by the other. The main site for the TCSO system is at Inskip Butte in the hills of the northeast portion of the county. The secondary site, which must be selected manually for use by both field users and dispatchers, is at Rancho Tehama Reserve which is west of both Corning and Red Bluff. These sites provide adequate coverage to the areas around them but their locations, and the fact that they operate separately, leave many areas with poor coverage. These areas include the insides of buildings in the cities of Corning and Red Bluff as well as on streets and in other open locales in outlying portions of the county. TCPW operates from just one site at Inskip Butte while TRAX operates from a subscription-based system (owned and operated by a local wireless systems service provider) at Cohasset Ridge just inside of Butte County. Maps depicting predicted/modeled coverage of the existing radio systems used by TCSO, TCPW, and TRAX are included in Appendix A of this report.

A second issue of concern among administrators and users of the various voice radio systems is the age and the possible lack of serviceability of their equipment. The radio systems of TCSO and TCPW use repeaters (the hill-top radio stations that receive and rebroadcast transmissions among dispatchers and field users) are no longer manufactured by their vendor. The same holds true of the dispatch consoles used by TCSO dispatchers as well as many of the mobile (in-car) and portable (hand-held) radios used by TCSO deputies, TCPW field workers, and TRAX drivers. To date, the age and discontinued-status of this equipment has not resulted in a situation in which they have been unserviceable. Service of existing systems was noted as being timely and effective. The age and status of the equipment is, however, likely to make service more difficult, slower, and more expensive to obtain in coming years.

The third issue of concern is that of the condition of radio sites. The condition of a radio site (including the grounds, shelter, and tower) can have significant impact on the radio system it



supports. In conducting on-site visits and assessments of the sites at Inskip Butte, the TCSO Dispatch Center, and the TRAX Dispatch Center, we noted one critical issue: The tower at the TCSO Dispatch (TCSO Jail) facility should be structurally assessed and strengthened/remediated per the outcome of that assessment. We also noticed a number of non-critical improvements that we recommend be made as part of a system upgrade/replacement. Those recommendations include improvements to site and tower grounding, antenna transmission line routing and grounding, site backup power, and equipment rack bracing.

A fourth issue, not raised by a significant number of users but aware to CDX Wireless through work on other agencies in California, is the lack of the TCSO's radio systems to support encrypted radio transmissions. Again, this was not noted as having significant impact to operations, however, in late 2020, the California Department of Justice released Information Bulletin 20-09-CJIS which addressed the subject of "Confidentiality of Information from the California Law Enforcement Telecommunications System (CLETS)". This required agencies to submit to the CA DOJ, CLETS Administration Section by no later than December 31, 2020, a plan for implementation of for either: i) encrypting radio calls that carry Personally Identifiable Information (i.e., information that identifies an individual such as name and driver license number) or ii) policies to restrict access to combinations of Personally Identifiable Information (e.g., transmit such information in separate/distinct radio calls). We understand that the TCSO implemented the second option and while it requires no new technology or changes to equipment, it does impose operational inconveniences. Therefore, the first option of incorporating encryption into TCSO voice radio calls is a feature to be considered for future systems.

A recognized strength/benefit of the existing voice radio system for TCSO is that the underlying platform of its technology; VHF, analog, conventional channels; is the same as that of many of the public safety agencies of its neighbors and partners. This includes the police, fire, and emergency medical agencies of Red Bluff and Corning as well as CalFire and the United States National Forests at Lassen and Mendocino. This common technology platform has allowed various methods of interoperability¹ to be developed and used among TCSO and it's neighbor/partners. The same technology platform is used by TCPW, however, the same methods of interoperability have not been created for them. This was identified as an issue and need by that organization. TRAX, through its use of an entirely different technology platform; UHF, trunked, Digital Mobile Radio; which is not used by any other public safety or public service agency in Tehama County; does not have easily available capabilities for interoperability. This, too, was identified as an opportunity for improvement in a future system. When necessary, coordination between TCSO, TCPW, TRAX, and others that do not have a common platform of radio technology occurs by telephone calls between dispatch centers.

This report also investigates and catalogs the current capabilities and noted needs for the computerized applications used for dispatch purposes by TCSO and TRAX. TCSO has, since 2016, used the RIMS computer-aided dispatch (CAD) application provided by Sun Ridge Systems, Inc. It is a full-featured program that facilitates the creation of incidents (based on input from 9-1-1 callers or TCSO deputies), the cross-referencing of details from an incident with other information in various databases, the prioritization of those incidents for dispatch, the assignment of resources to respond to an incident, and the drafting and filing of reports as the incident is managed and resolved. RIMS

¹ A term often defined for public safety voice radio communications as the ability for emergency management, response, and recovery personnel and their affiliated organizations to communicate within and across agencies and jurisdictions in real time, when needed, and when authorized.



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operates on a resilient/redundant hardware and network platform that is refreshed on a regular schedule. TCSO dispatchers view RIMS application as a reliable and effective tool for their duties but there were some noted requests for enhancements (an interface to evidence inventories and the ability for other departments to view and print reports).

TRAX uses a much simpler application for managing dispatch operations. The Rides Unlimited program is used only for collecting requests-for-rides and managing the subsequent delivery of service for TRAX's ParaTRAX dial-a-ride rideshare program. This program is no longer produced by its vendor and that has not prevented its continued beneficial use at TRAX, however, its unsupported status could make continued operation an issue in the future. Although there are many commercially-available Intelligent Transit System (ITS) software applications for transit operators such as TRAX; with features such as location tracking, passenger counts, bus equipment status, driver pre-set messages, and driver emergency notifications; TRAX does not currently use any such an application to manage its fixed-route bus service. This was also noted as a potential need and a future opportunity to improve driver and rider satisfaction, efficiency, and safety.

These and other findings and recommendations are developed and presented in more detail throughout this report and all are presented as a summary in Section 5, "Compilation of Action Items & Next Steps".



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1. Purpose and Scope

This Inventory and Needs Assessment Report documents the condition and performance of the public safety and public service two-way radio communications systems and computerized dispatch applications/programs in use by the Tehama County Sheriff's Office, Tehama County Public Works, and the Tehama Area Rural eXpress (TRAX).

This report will be used as the basis for future reports that present plans and budgets to refresh or replace those two-way radio systems.

2. Methods and Format

2.1. Methodology

To complete this Report, staff from CDX Wireless worked with representatives of the Tehama County Sheriff's Office, Tehama County Public Works, and the Tehama Area Rural eXpress (TRAX), collectively referred to in this report as the "stakeholder agencies", to radio sites and dispatch centers to assess their conditions. The radio sites visited were:

- Inskip Butte
- The Tehama County Sheriff's Office Dispatch Center
- The TRAX Dispatch Center

Full site-walk forms have been prepared, and are included in Appendix B this report, for those sites. Other sites that house lower-power control-station radios are important, however, their conditions are not as critical to the operation of the current system and, therefore, they were not visited and site-walk forms for them have not been prepared.

Our staff also conducted face-to-face or telephone-based meetings with representatives of the stakeholder agencies. During these meetings, our staff gathered information about the operations of each organization, their concerns and issues regarding the current radio system, and the needs they may have for a future radio system. Information about each organization's radio inventory was also solicited.

Surveys on the same topics as covered in the meetings (i.e., issues with the current system and needs for a future system) were prepared and distributed to the stakeholder agencies and the following levels of responses were gathered:

- Tehama County Sheriff's Office (TCSO): 18 participants
- Tehama County Public Works (TCPW): 2 participants
- TRAX: 19 participants

Finally, phone conversations were held with the following agencies with whom the stakeholder agencies communicate via radio²:

² Attempts were made to contact the USFS Lassen National Forest but discussions were never held with their representatives.



- City of Red Bluff Police Department
- City of Red Bluff Fire Department
- City of Red Bluff Public Works
- City of Corning City Management
- City of Corning Police Department
- City of Corning Fire Department
- City of Corning Public Works
- California Department of Forestry and Fire Protection (CalFire)
- California Governor’s Office of Emergency Services (CalOES)
- USFS Mendocino National Forest

These activities of site visits, meetings, discussions, and surveys occurred during the period of February to July, 2021.

In our meetings, discussions, and surveys, we used the following list of topics and details to guide the discussions and to collect respondent information:

Table – Attributes of Radio System Performance to be Studied

Radio System Topic	Details Collected:
Coverage	Where is wireless access provided and where is it required? What levels of coverage reliability are required?
Capacity	How many users does the system need to support and how many channels are required for the various agencies?
Channel Selection	Are the purposes of various channels known and it is easy to select (and use) the correct channel for various situations?
Channel Scanning	Are there easy processes for scanning (monitoring) other channels (other than one’s primary-use channel) in order to have a necessary level of situational awareness?
Equipment Usability	Are the layouts and controls of the user radios, including accessories, easy to use so as to efficiently and effectively conduct operations?
Features	Which functions (e.g., encryption, over-the-air rekeying, mixed conventional-and-trunking operations, scan, and emergency) are required for the voice radio system networks?
Interoperability	What level of communications between departments and outside agencies is required and how are those communications established and conducted?
Service	Are the levels of response for technical assistance appropriate to maintain radio operations and is service provided in a timely manner?

Radio coverage predictions of the existing radio system were also prepared using the information gathered from the site visits. These computerized predictions are included in Appendix A this report



and they serve to record the current system's coverage performance. (This provides a baseline against which alternative designs for system enhancements can be compared.)

To evaluate the computerized dispatch applications/programs used by TCSO and TRAX (note: TCPW does not use any such application) we viewed their operations at their respective dispatch centers and we discussed their benefits and unmet needs with users. We also investigated the support structures in place to ensure their continued operation as well as, in the case of TRAX, alternatives for more advanced applications as possible future deployments.

2.1. Report Format

This report is organized as follows:

- Section 3 provides an overview of the existing voice radio systems including:
 - A description of the physical assets of the system
 - Descriptions of relevant channels and systems of other systems (partner and neighboring agencies)
 - Appendix A includes the predicted coverage maps of the system
 - Inventories of the user equipment (per-agency list of radios in use)
 - A summary of the conditions of the system-level sites that were visited as well as any recommendations for improvements that may be required
 - Appendix B includes the completed site visit forms for those sites. The level of detail in them can be used by Tehama County to inform any vendor who may conduct work on the sites of their current conditions
 - An overview of the support structure in place to maintain and service the existing radio systems.
 - A summary of the issues they identified by users from TCSO, TCPW, and TRAX regarding their current systems and the needs they expressed for a possible future system
 - Appendix C includes the full set of responses to our online survey about user needs.
- Section 4 provides an overview of the software applications, such as Computer Aided Dispatch (CAD), as used by TCSO and TRAX
- Section 5 compiles the recommendations for immediate actions and for user needs that are to be carried forward into our future report on a replacement system.

Throughout this report, call-out boxes are used to highlight specific points. These include:

- a) The summary or main ideas of a section or topic – these are referred to as "Takeaways" and are identified by the following symbol





b) Those findings that required immediate attention – these are referred to as “Immediate Action Required” and are identified by the following symbol



c) Those findings that do not require immediate attention but should be addressed in a possible future system (i.e., those issues, concerns, or needs that will be addressed in future reports) – these are referred to as “Carry Forwards” and are identified by the following symbol



To ensure the points of these “Immediate Action Required” and “Carry Forward” call-outs are not lost in the narrative of this report, Section 5 compiles both the list of actions requiring immediate attention as well as the issues to be carried forward into our next report.

3. Review of Voice Radio Systems

The radio system that serves the stakeholder agencies of the Tehama County Sheriff’s Office, Tehama County Public Works, and TRAX is actually a collection of a number of individual systems.

For the sake of this report, the phrase “Tehama County radio system” refers to the radio sites and equipment used by just the stakeholder agencies. There are radio systems within Tehama County that are used by organizations other than those listed above (including other local-level, state-level and federal-level government agencies) and while they are outside of the scope of this project, this report will address the needs the stakeholder agencies have for interoperable communications with their local-, state- and federal-level public safety partners (and with those in neighboring counties).

3.1. Review of Technology and Terms

Before describing in further detail the public safety radio systems in Tehama County, the following is a review of general radio-system technologies and terms. This narrative is accompanied by a diagram on Page 10, below, that illustrates the terms it uses.

The channels used by the different user groups may operate in either direct or repeated mode. A direct channel (also called a simplex or talkaround channel) operates with one frequency – a user radio transmits on that single frequency and other user radios that are tuned to that same single frequency are able to hear the originating unit’s transmissions. (This report uses the terms “portable” for a handheld radio, “mobile” for a car-mounted radio, and “subscriber” for any kind of mobile or portable radio). Communications on direct channels are often of limited distance because the transmit power level of a portable or even mobile radio is not high enough (nor is their antenna of sufficient height) to produce radio signals that travel very far.

To achieve greater range, a channel may be repeated through the use of a pair of frequencies and the deployment of a repeater. A repeater is a higher-power radio station that is housed at a radio site (usually of high elevation) and which uses the two frequencies as follows: one frequency is used to broadcast radio signals to subscriber radios and the second and receives signals from them. When the repeater receives a transmission from a subscriber, it immediately rebroadcasts it to all other subscribers. Subscriber radios transmit and receive on the opposite frequencies used by the repeater.



More than one repeater can operate on the same pair of frequencies if: i) they are separated by enough distance so that their transmissions will not overlap or ii) in cases where there is not sufficient separation then some mechanism of control is used to ensure their transmissions do not interfere with each other. A simple method for preventing interference among repeaters using the same pair of frequencies is the Continuous Tone-Coded Squelch System (CTCSS, often also referred to "Private Line" or "PL" which is a marketing term used by one equipment manufacturer)³. CTCSS uses subaudible tones to differentiate transmissions among several repeaters that operate on the same set of frequencies. If a repeater is programmed to operate with a CTCSS tone, when it receives a transmission from a subscriber, it will determine if that transmission carries the same CTCSS tone. If the transmission carries the same tone, the repeater will repeat the transmission (and if it does not, the repeater will not repeat it). Likewise, subscriber radios can be configured to transmit different CTCSS tones. In this way, a user can select the combination of one CTCSS and one frequency pair to transmit to/from one repeater and another CTCSS tone to transmit to/from on another repeater on the same frequency pair. When the subscriber transmits on the first combination, their transmission will only be repeated by the repeater that is configured with the same CTCSS tone (and, if their transmission is received by another repeater, even one that uses the same frequency pair, that is not programmed with the same CTCSS tone, it will not be repeated by that second repeater).

Fixed-location users such as dispatchers can participate in communications on either simplex or repeated channel by using a high-power simplex control-station radio which is, essentially, a mobile radio that has a fixed location and which has antennas mounted on a roof of a building or in another elevated location. Control stations may be used by dispatchers via their dispatch consoles or they may be used by operators that use a deskset, a device that looks like a desk telephone but whose handset carries voice to/from the radio and the operator. (Note that the control station does not need to be located in the same facility as the dispatch console or deskset to which it is connected but they do require some connectivity to the dispatch console or deskset.) Control stations do not, however, extend the communications range of field-unit to field-unit transmissions.

Some control stations support multiple channels (including a mixture of direct and/or repeated channels) that can be selected by the dispatcher or other fixed-location operator. The use of a control station for dispatchers is referred to as a "wireless dispatch connection." Alternately, some dispatch consoles have a "wireline connection" in which they replace their control stations with a direct (leased phone line or network) connection to the system's repeaters. A wireline connection allows dispatch to hear the best possible audio from subscriber radios as that audio is directly from the channel's fixed-location receiver(s). Such a connection also allows the dispatcher to control the audio that is transmitted on the channel; the connection allows them to interrupt the audio that is being repeated should they have a higher-priority transmission. This ability is known as "dispatch priority". The dispatch consoles in Tehama County currently use wireless (not direct/wireline) connections.

There are operational scenarios in which two field user radios can be close enough to each other to communicate directly via a simplex channel while being distant enough (or sufficiently blocked by

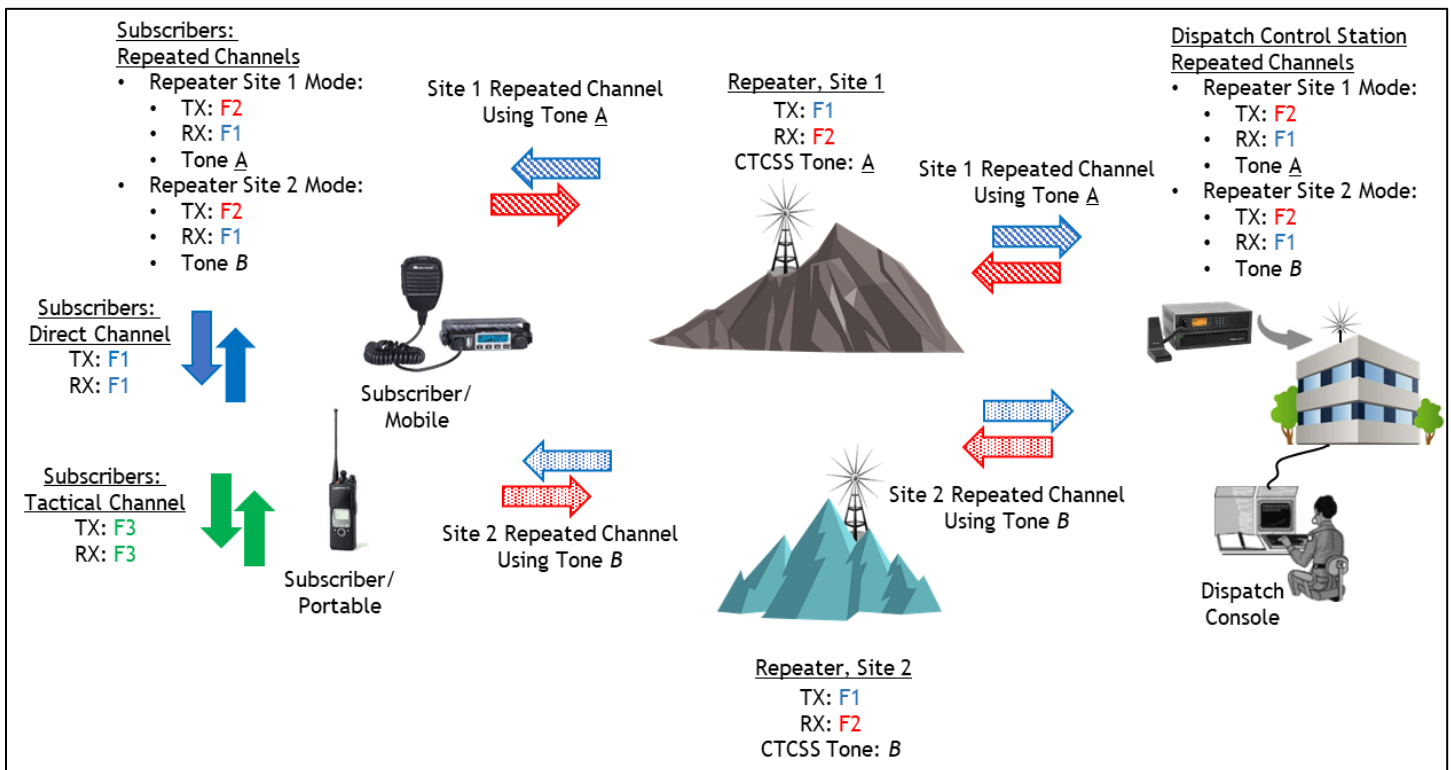
³ A second way of allowing more than one repeater in nearby proximity to use the same pair of frequencies is simulcast. In simulcast, complex methods of control are used to ensure that the two (or more) repeaters transmit the same signal in such a way and with very precise timing so as to prevent interference. Whereas CTCSS prevents interference by preventing more than one repeater from transmitting the same signal on the same pair of frequencies, simulcast controls interference, through additional equipment, so that multiple repeaters extend the transmission of the same signal on the same pair of frequencies.



obstructions such as building walls) from a repeater to prevent effective repeated-channel communications. For this reason, operations such as fireground (in-building firefighting) operations, which place importance on communications between firefighters that are operating at the same dangerous scene rather than on communications with distant resources such as dispatchers, often use direct channels. Because conversations on direct channels are not carried on repeaters, they will not include the dispatcher unless: i) they are manually relayed between the direct channel and a dispatch-connected repeated channel by someone operating two radios or ii) a control station operating on the direct channel and in the area of the direct channel's use is connected to dispatch.

The following figure shows how each of the system components described above communicate with each other. (This figure is illustrative of a hypothetical/sample radio system; not of any specific system in Tehama County.)

Figure – Radio Technology Nomenclature Used in this Report





3.2. Tehama County Public Safety Radio Channels and Sites

The following are general descriptions of the individual channels and systems that serve the stakeholder agencies of TCSO, TCPW, and TRAX:

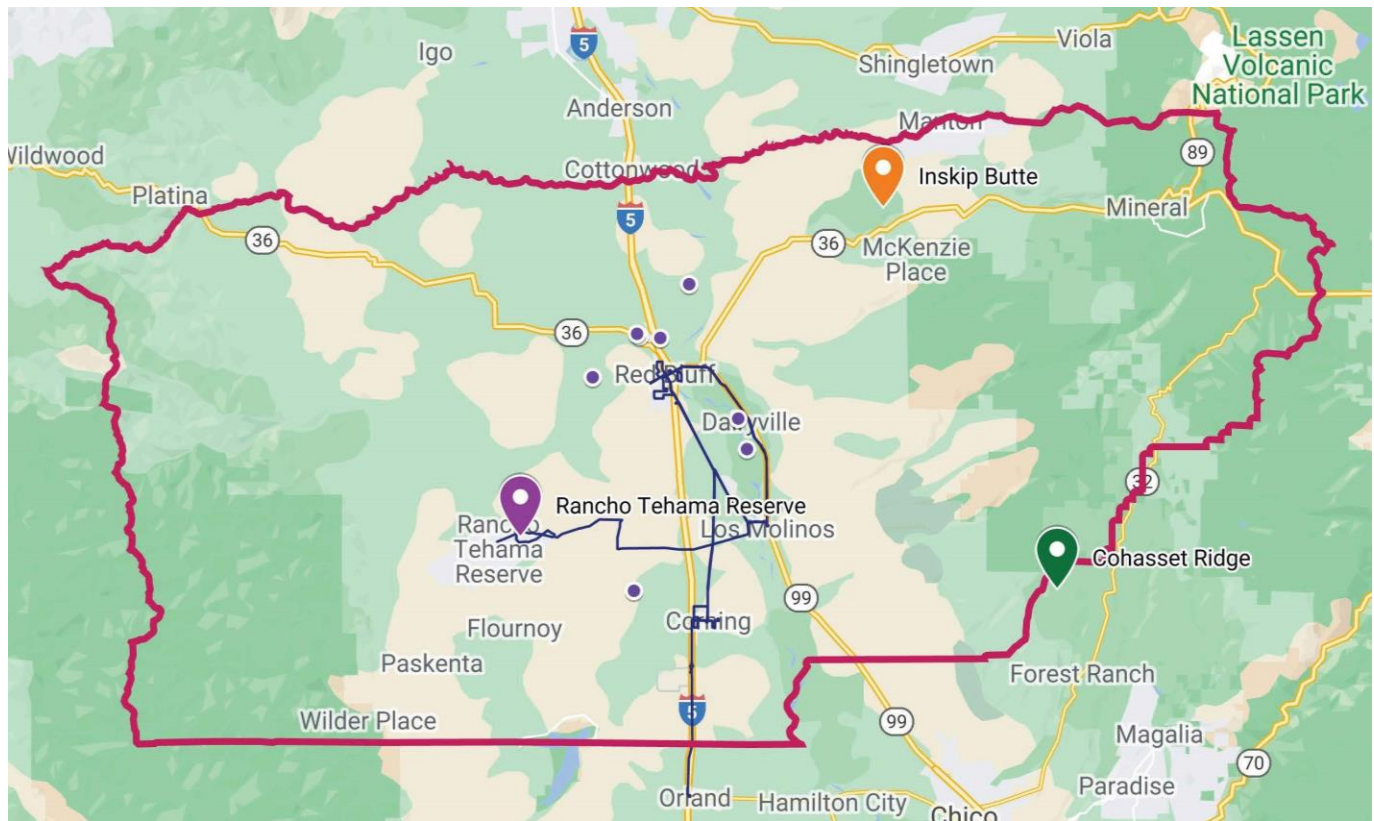
- **The Sheriff's Office Repeated Channel (TCSO)**: This is a repeated channel that uses frequencies in the Very High Frequency (VHF) spectrum band of 150MHz to 174MHz (known as the "Business and Public Safety VHF Band") and analog modulation. This channel has two repeaters that operate on the same frequency pair but use different CTCSS tones. The repeater that is considered to be the main provider of coverage on this channel in Tehama County is located at the site at Inskip Butte. The other repeater that operates on this channel is in Rancho Tehama Reserve. The two repeaters are programmed with different CTCSS tones and the subscriber radios of the Tehama County Sheriff's Office are programmed with different modes (different selections on their channel selectors) for the two different repeater locations. This allows users in the central/northern part of Tehama County to communicate through the repeater at Inskip Butte and users in the southern/western part of Tehama County to use the repeater in Rancho Tehama. Both repeaters are both available to the Tehama County Sheriff's Dispatch Center via a control station (i.e., wireless link).
- **The Department of Public Works Channel**: Like the Sheriff Office Repeated channel, this is a repeated channel, also in the VHF band, using analog modulation, and with a repeater at Inskip Butte. There is no second repeater for this channel. This channel is also available to the Tehama County Sheriff's Dispatch Center via a control station (i.e., wireless link).
- **The TRAX System**: TRAX uses a different approach to its radio communications. It does not own the repeater that is used by its dispatchers and the drivers of its transit and paratransit vehicles. TRAX purchases radio service from a commercial provider of radio communications. That provider, Day Wireless, operates a multi-channel, digital, trunked radio system that operates in the Ultra High Frequency band (450-470MHz) with repeaters at the Cohasset Ridge location (approximately 25 miles east of Corning, CA in Butte County). TRAX owns the subscriber radios that are in its vehicles and used by its personnel and they have access to one talkgroup (which can be thought of as a virtual channel) for all TRAX operations. For the use of this one talkgroup, TRAX pays a monthly fee. The technology of this channel is Digital Mobile Radio (DMR) which is an open digital radio standard (i.e., it allows equipment from multiple vendors to work together in one system) that was developed to be a low-complexity, low-cost radio solution for business and industrial radio users.
- **The "LE NET" Repeated Channel**: This is a repeated channel that uses a section of VHF band that is allocated to US Federal agencies. This channel uses a repeater that is located in the northern part of the county. It is used by law enforcement officers that operate in areas not served by the Sheriff's Office repeater at Inskip Butte. The exact location of this repeater, and the exact frequencies it uses, were unknown to anyone in Tehama County and, because this repeater uses frequencies that are allocated to US Federal agencies, public records about



it are unavailable. This channel is also available to the Tehama County Sheriff's Dispatch Center via a control station (i.e., wireless link).

The following map shows the positioning of the repeaters at of Inskip Butte, Rancho Tehama Reserve, and Cohasset Ridge. Included on this map are the boundary of the County (in dark red), the routes of TRAX (Routes 1, 2, 3, 5, and 6 as well as the RTR and Glenn/Tehama Connect route are in purple; not shown is the Glenn Ride route), and selected points served by ParaTRAX in the months of July and August 2021 that are not near TRAX's fixed routes (as purple points). Note that maps of the predicted coverage from these sites are included in Appendix A.

Figure - Map of Repeated Radio Channels in Tehama County (all system sites)





Takeaway



The channel used by TCSO relies on one pair of repeated frequencies that has two locations, the sites at Inskip Butte and Rancho Tehama Reserve. Users select either site by choosing a mode on their radios but once a site is selected their transmissions are repeated only around that area of the selected site. The channel used by TCPW relies on one repeated frequency pair at only one site, also Inskip Butte. TRAX uses a fee-for-use radio system operated by Day Wireless with one radio site at Cohasset Ridge in Butte County.

In addition to the repeated channels described and mapped above, there are a number of direct and tactical channels used in Tehama County. A direct channel uses one of the frequencies used by a repeater (typically the repeater’s transmit frequency) while a tactical channel uses frequencies that are not used by a repeater. Those channels are typically used by users who are assigned to work on a specific incident or event and whose communications may be but do not need to be monitored by dispatch. Examples include firefighters who work at the scene of a fire (whose actions are under the control of an Incident Commander who maintains communications with dispatch via a repeated channel) and search-and-rescue personnel who are involved in a response in a remote area that has no coverage from a repeated channel. An example of a direct channel in Tehama County is the “TCSO 2” channel which is used for car-to-car communications by TCSO deputies (and whose transmissions are monitored by TCSO dispatch, when they are able to be received at that location).

3.3. Tehama County Radio System Equipment and Technology

The equipment that is used as repeaters for the TCSO channels are Motorola Quantars while the one used for the TCPW channel is a Motorola Radius. Both of these repeater models have been discontinued by Motorola.

The antenna networks, which include the tower-mounted antennas as well as combiners and multicouplers (which allow multiple radio stations to operate using a shared antennas) as well as transmission lines vary at each site in age, condition, models, and manufacturers. Additional information on the condition of sites and antenna networks is found in Section 4 of this report.

Two additional descriptors can be used to describe the technology of the TCSO and TCPW radio systems in Tehama County; “conventional” and “analog”.

The TCSO and TCPW radio systems provide “conventional” radio operations which can be considered the most basic type of operations. Two or more users have a dedicated channel (either single frequency for direct mode or frequency pair for repeated mode) and, through their radio’s controls, they select the channel on which they will operate. When a user needs to communicate with another user, the first user simply presses the “push-to-talk” or PTT button on their radio and begins speaking. By pressing his PTT, the user activates the radio’s transmitter and the radio converts the user’s voice through the modulation process into a radio wave that transmits through the air. The radio at the distant end receives this signal, demodulates it, and emits the spoken voice from a speaker in the radio. A repeater may be used to extend the range of communications, as described above. In conventional operations, users hold the responsibility to select the channel on which they will communicate. This leaves open the possibility that two or more users will press their PTT buttons at the same time, thereby “talking over” each other.



The TCSO and TCPW channels operate in “analog” mode which means that the voice communications are carried on radio frequencies by directly modulating a carrier frequency.

Although the TCSO and TCPW radio channels use only analog modulation, they are capable of supporting the transfer of limited data signaling via burst-data signaling. This technology is available in most of the TCSO and TCPW radios but is not currently configured for use. It can provide some features above just the transmission of voice conversations such as unit identifiers (IDs), status buttons, emergency button, and others. It works by transferring on the radio channel low-speed data (1,200 baud) in short bursts that occur either at the beginning or end of transmissions. For these burst-data signaling features (which are typically referred to be a trade name of MDC1200) to be enabled in TCSO and TCPW radios, they would need to be reprogrammed in user radios and the dispatch equipment must also be reconfigured to receive and process them. Again, from our process of inventorying the radio systems of TCSO, as well in in interviewing radio users from those organizations, we understand that while most TCSO radios are capable of operating with MDC1200 functionality, very few radios are programmed to do so. (Per input from users, as described below, users do not view MDC1200 features as critical.)

Additionally, TCSO’s channels do not support the feature of encryption in which user voice calls are scrambled with a secure mechanism so that they cannot be intercepted and listened to by unauthorized parties. Encryption was not strongly identified as a user need however, recent mandates have raised it’s importance. In October 2020, the California Department of Justice (CA DOJ) released Information Bulletin 20-09-CJIS which addressed the subject of “Confidentiality of Information from the California Law Enforcement Telecommunications System (CLETS)”. This required law enforcement agencies in the state to submit to the CA DOJ, CLETS Administration Section by no later than December 31, 2020, a plan for implementation of for either: i) encrypting radio calls that carry Personally Identifiable Information (i.e., information that identifies an individual such as name and driver license number) or ii) policies to restrict access to combinations of Personally Identifiable Information (e.g., transmit such information in separate/distinct radio calls). We understand that the TCSO implemented the second option and notified CA DOJ of its plans to transmit various pieces of PII in separate unencrypted transmissions. While this approach requires no new technology or changes to equipment, it does impose operational inconveniences.

Implementing encryption to voice radio calls can be accomplished on systems and equipment that use analog technologies, however, the resulting audio quality of the received voice signal is often greatly degraded. Many agencies that deployed encryption techniques on analog radio channels later disabled encryption due to the poor audio quality it produced. Digital systems, such as those described below, are capable of implementing encryption without degradation to audio quality. Therefore, the first option as expressed by CA DOH of incorporating encryption into TCSO voice radio calls is a feature to be considered for future, potentially digital, systems.

In contrast, the radio system used by TRAX uses “trunked” and “digital” technologies. In trunked operations, users select a talkgroup which defines the set of others with whom they wish to communicate and when they press their PTT button, the system’s centralized control computers direct that set of users to talk on an available channel. Trunking operations prevent the occurrence of users talking over each other, however, trunking works only in repeated mode and it does not support the simplex (direct or tactical) modes of communications.

Digital techniques exist to modulate a radio frequency and when they are employed, they can provide enhanced operations such as allowing more than one conversation to occur on a single channel and



the transmission of data signaling. Digital radio modulation techniques have become deployed with increasing regularity in public safety and transit radio systems in only the past 15 to 20 years. The specific technology of digital radio used by TRAX is Digital Mobile Radio (DMR) which is an open digital radio standard that was specified by the European Telecommunication Standards Institute (ETSI). Products built to the DMR standard also comply with the U.S. Federal Communications Commission (FCC) mandates for the use in 12.5 kHz narrowband systems covered by Part 90 regulations.

ETSI's primary goal for DMR was to specify a digital system with low complexity, low cost, and interoperability across brands to provide a solution for business and industrial radio users. The DMR protocol covers unlicensed (Tier I), licensed conventional (Tier II) and licensed trunked (Tier III) modes of operation, the latter being used by TRAX. Tier II and III DMR further uses a technology of two-slot Time Division Multiple Access (TDMA) in which two voice conversations can simultaneously be carried on one 12.5 kHz radio channel. These Tiers also provide the ability to carry both voice and data services in the same system⁴. (The technology of MDC1200 is used only with analog conventional radio systems and the technologies of trunking and digital modulation, including DMR, have built-in mechanisms to provide MDC1200's features.)

As noted above, the trunked DMR radio system used by TRAX operates in the UHF frequency band, is located at Cohasset Ridge, and is operated by Day Wireless. TRAX owns the subscriber radios it uses but pays a monthly subscription/usage fee to Day Wireless for use of the system.

Note that none of these systems use a different digital-radio technology that has become the de facto standard for digital two-way radio communications for public safety operations in North America. That digital-radio technology is Project 25 (P25) which was developed by the Association of Public Safety Communications Officials (APCO) and codified as a suite of specifications by the American National Standards Institute (ANSI) as TIA-102. Products built to the P25 standard are generally recognized as meeting public safety organizations' needs for feature sets, competitive procurement, interoperability, and audio quality. More on P25 is included in later sections of this report.

Takeaway



The channels used by TCSO and TCPW use a common set of technology of analog, conventional, and VHF. The use of analog technologies for TCSO does meet currently-identified user needs but it's inability to support encryption with acceptable audio quality imposes operational inconveniences. The fee-for-use radio system used by TRAX uses a different set of technologies; digital DMR, trunked, and UHF. Although both sets of technologies have the capabilities to carry limited amounts of data signaling (DMR more than analog conventional), none of the three organizations currently use those capabilities.

⁴ The over-the-air data rate of DMR is 9,600 bits per second (bps) and this rate can be used as two, time-division-separated 4,800 bps streams (each carrying voice or data) or, on a temporary basis for short messages, it can be allocated into one, constant 9,600 bps stream.



Various technologies should be evaluated for future systems; including different radio frequency bands, analog and digital modulation methods, and conventional and trunked architectures; however, they should all be evaluated against their ability to meet user needs for performance (including coverage, features, interoperability) and cost.

3.4. Tehama County Radio System Coverage

CDX Wireless has developed computer-based models of the coverage of the repeated, wide-area public safety and public service radio channels in Tehama County; namely,

- The TCSO channel at Inskip Butte
- The TCSO channel at Rancho Tehama Reserve
- The TCPW channel at Inskip Butte
 - NOTE: While this radio site is the same as that used by TCSO, differences in repeater and user equipment will result in different predicted and actual coverage.
- The Day Wireless DMR system at Cohasset Ridge that is used by TRAX

The coverage model maps we have developed are provided to establish a baseline for as-is system performance and they will be used for comparison purposes in our subsequent report in order to develop and model alternatives for expansions/replacements that better meet user needs.

To develop these models, CDX Wireless used SignalPro™ as its coverage prediction software. This program allows us to define all of the information about Tehama County's channels/systems including the transmitter power and the receiver sensitivity of the repeaters and the subscribers, the heights of antennas, the gains of the antennas, the losses of cables, and the elevations of sites⁵. Using this information as well as established simulation methods for calculating signal loss over distance, SignalPro™ can produce maps that show the locations in a given area that can be expected to have the radio signal levels that are required to deliver reliable communications.

To maximize the accuracy of our models, we incorporate the latest local terrain and morphological (land-use clutter) datasets. The National Elevation Dataset (NED) is the primary elevation data product of the United States Geological Survey (USGS) and we used 1/3 arc-second data which allows our model to establish elevation in grids that are approximately 10 meters square.

While terrain has a profound effect on the propagation of radio signals, more localized features of the environment, such as trees, buildings, and houses, can also have a substantial impact. Signal propagation may be limited more by local obstructions such as urban and residential or, in forested areas, leaves and branches. SignalPro™ accounts for these effects by specifying attenuation values

⁵ Coverage predictions for the Day Wireless DMR system at Cohasset Ridge used by TRAX and the TCSO Channel at Rancho Tehama Reserve are based on information taken from publicly-available Federal Communications Commission (FCC) licensing files. Coverage predictions for the TCSO and TCPW channels at Inskip Butte are based on information collected during our staff's visits to that site.



for each area under study. CDX Wireless uses the latest National Land Cover Database (NLCD) for populating its clutter database. The NLCD is developed in coordination with the U.S. Geological Survey (USGS) and other federal agencies to generate consistent and relevant land cover information at the national scale. The spatial resolution is 30 meters providing highly detailed information on typical land cover within that grid.

The coverage model maps we prepare are specific to a specific operational scenario. When creating a map, we define:

- The subscriber-radio usage scenario to be depicted. Coverage to and from a mobile radio (which has high power and whose antenna is mounted on the unobstructed roof of a car) will be different from that of a portable radio (which has lower power and, by being located in a belt holster, whose antenna will be lower and which may be obstructed by the body of the operator). Additionally, different maps will be prepared for the talk-in (from subscriber radio to system) and the talk-out (from system to subscriber radio) paths of communications.
- The location of the radio. A mobile radio will, obviously, be expected to be operating outdoors, however, portable radios will be specified as operating on-street or in a building. Additionally, the size of the building may also be specified as a "light" building (such as a single-story residence), a "medium" building (such as a small industrial building or store), or a "heavy" building (such as a multi-story office building, a large school, or a hospital).
- The level of coverage reliability to be depicted. For example, we state that the maps show those areas in Tehama County in which a user can expect to have successful communications in 95 of 100 attempts to communicate (i.e., in 95 times of 100, the user will be able to push-to-talk and successfully deliver their audio conversations to others). This example would be referred to as 95% coverage area reliability.
- The level of audio quality modeled. Radio coverage design standards provide a measurement of audio quality using a scale of 1 to 5 in which a higher number represents a better level of audio quality. This scale is referred to as Delivered Audio Quality (DAQ). A DAQ level of 1 is unusable audio and a DAQ level of 5 is considered perfect. For Public Safety, the accepted objective is to provide a DAQ level of 3.4 which is defined as "speech understandable without repetition and with some noise and/or distortion."

Because of these possible differences in scenarios, it is important to account for all variables when viewing a coverage prediction model. Our maps include a list of all of the variables included in a statement such as "95% Talkout Coverage Area Reliability with DAQ of 3.4 to a Portable Worn At-Hip and at Street Level".

The coverage maps we have developed for TCSO, TCPW, and TRAX, for the systems/channels listed, above depict 95% coverage area reliability in the following scenarios (all using DAQ of 3.4)^{6, 7}:

⁶ Because TRAX and TCPW operate only mobile (vehicle-mounted) radios, we have not prepared coverage prediction maps showing their use scenarios of portable radios.

⁷ For Public Service and Transit, a DAQ level of 3.0, which is defined as "speech understandable with slight effort, occasional repetition due to noise or distortion may be required" is sometimes considered as a viable alternative to a DAQ of 3.4, however, for consistency, we have used a DAQ of 3.4 for all maps for all organizations included in this report.



- FOR TCSO ONLY: Portable At Hip and On-street
 - Talk Out: Repeater to portable
 - Talk In Portable to repeater
- FOR TCSO ONLY: Portable At Hip and In Light Building (a residential building with loss of 10 dB)
 - Talk Out: Repeater to portable
 - Talk In: Portable to repeater
- FOR TCSO, TCPW, and TRAX: Mobile On-street
 - Talk Out: Repeater to mobile
 - Talk In: Mobile to repeater

The maps use two different colors to depict talk-in and talk-out coverage; they are displayed with transparency so that areas of light purple are predicted to have talk-in coverage, areas of dark purple are predicted to have talk-out coverage, and areas of both (i.e., red) are predicted to have both.



It is important to recognize that only those areas that have both talk-in and talk-out coverage will have reliable two-way communications. Those areas that have only talk-out coverage (i.e., those shown only with purple shading) will allow a field user to receive a transmission from the site but will not reliably allow a field user’s radio’s transmissions to be received by the system. In such a location, a user will hear a call from a dispatcher or other field user but their response will not be received or heard by others. **Therefore, when viewing our provided coverage prediction maps, viewers should recognize only the areas that have both talk-in and talk-out coverage (i.e., the areas in red) as the areas that have reliable two-way radio coverage.**

The maps are included in Appendix A and they are ordered as follows:

Table – Index of Coverage Maps Included in Appendix A

Radio Channel & Site	Map #	Map Description
<u>TCSO INSKIP BUTTE</u>	Map 1	Mobile on Street (Talk-In & Talk-Out)
	Map 2	Portable at Hip & on Street (Talk-In & Talk-Out)
	Map 3	Portable at Hip & In Building (Talk-In & Talk-Out)
<u>TCSO RANCHO TEHAMA RESERVE</u>	Map 4	Mobile on Street (Talk-In & Talk-Out)
	Map 5	Portable at Hip & on Street (Talk-In & Talk-Out)
	Map 6	Portable at Hip & In Building (Talk-In & Talk-Out)
<u>TCPW INSKIP BUTTE</u>	Map 7	Mobile on Street (Talk-In & Talk-Out)
<u>TRAX –DMR SYSTEM AT COHASSET RIDGE</u>	Map 8	Mobile on Street (Talk-In & Talk-Out)



<p>Takeaway</p> 	<p>Predicted/modeled coverage of the channels/systems of TCSO, TCPW, and TRAX are shown on maps included in Appendix A. Each map includes a specific description of the scenario it models (in-car radio vs hand-held radio, etc.). These maps show where reliable radio coverage can be expected as well as the locations where it cannot be expected. In summary, our maps depict that the TCSO Inskip Butte site provides good mobile-radio coverage to the north and central areas of the county while the site at Rancho Tehama does the same for the south-central areas. These sites do not provide coverage to the outlying western and eastern edges of the county and because they operate separately, there is not countywide mobile coverage for TCSO. The TCSO sites provide much more limited coverage to portables operating on the street and virtually not coverage to portables in buildings. Coverage is better to TCPW and TRAX as they only (or predominately) use mobile radios, however, their coverage is also generally unavailable in the western and eastern areas of the county.</p>
	<p>Improving coverage to TCSO, TCPW, and TRAX is an important goal for a new system. This includes ensuring a new system delivers radio coverage in areas not currently served as well as enable county-wide coverage (i.e., the ability for users at distant ends of the county to talk directly to each other without imposing cumbersome site/channel selection methods).</p>

3.5. Tehama County Voice Dispatch Equipment

Dispatch operations for TCSO occur from the TCSO Dispatch Center. TCSO Dispatch is equipped with three (3) Motorola MIP5000 dispatch consoles for voice dispatching operations. All three MIP5000 consoles have access to the TCSO Inskip, TCSO Rancho Tehama Reserve, and TCSO 2 (car-to-car) channels. (Because the TCSO 2 channel is a direct channel, dispatchers at TCSO will only be able to receive and hear transmissions on it when the operators of that channel are in proximity of the TCSO Dispatch Center – when users of TCSO 2 are not near the dispatch center, their transmissions may be missed by dispatchers.)

The method of connectivity between the MIP5000 dispatch consoles and the radio channels is via control stations. The MIP5000s connect to a set of interface boxes (MIP5000 Gateways) that then connect to control station radios that are on the second story of the TCSO jail facility. The control stations are tuned to the specific channels of TCSO and TCSO 2. When dispatchers transmit on those channels, their transmissions are carried through the interface boxes to the control station radios and broadcast to users. On the TCSO channel, this occurs via the TCSO repeaters. On the TCSO 2 channel, this occurs on the direct frequency. The opposite occurs when user radios transmit – their transmissions are received by the control stations and routed, via the interface boxes, to the MIP5000 consoles.



TCSO dispatchers can select between the two locations of the TCSO radio channel – the controls of the MIP5000s allow them to select transmitting on, and receiving from, the Inskip Butte site or from the Rancho Tehama Reserve site.

The MIP5000's are also connected to control stations that are tuned to other, non-TCSO channels including:

- The TCPW channel
- The dispatch channels of neighbor/partner agencies including:
 - The Red Bluff Police Department's "RBPD" channel
 - The Corning Police Department's "CPD" channel
 - The USFS Lassen National Forest's "LNP Turner" channel
 - The California Highway Patrol's "CHP Monitor" channel
 - The CalFire "FIRE Monitor" channel
- The interoperability channels of:
 - LE NET
 - CALAW 1
 - CLERS 7

[The term "neighbor/partner agency" refers to those agencies that provide public safety services to other jurisdictions within Tehama County. The term "interoperability channel" (also referred to as a "mutual aid" channel) refers to radio channels that are established at the local, state, or national level for the expressed purpose of as-needed multi-discipline or multi-jurisdictional communications for purposes such as a response to a large-scale event or incident. Interoperability channels are not for daily uses such as dispatch nor are they to be used solely by one organization.]

We were informed by TCSO dispatch personnel that dispatcher rarely, if ever, transmit on these non-TCSO channels – they are present at the MIP5000's in order to allow TCSO dispatchers to monitor and be aware of situations in which those neighbor/partner agencies may be engaged.



Beside the main functionality of transmitting and receiving audio to/from field users, these dispatch consoles support the following features:

- Multiselect: which allows a dispatcher to simultaneously broadcast their audio on two or more channels (but without creating a patch between them that would allow the transmissions of field users of one channel to be heard by field users of another channel).
- Maker Tones: which allows a dispatcher to generate pre-established tones on a channel (or on a patch or Multiselect of channels) that can indicate field users of a special incident that requires transmissions of only high-priority calls.

The MIP5000 is no longer a current product as offered by Motorola and its status as a cancelled product may make its service (including availability of repair and maintenance) harder or more costly to obtain.



Voice dispatch operations for TCPW and TRAX are simpler than that of TCSO. TCPW and TRAX each have one control station that is tuned to their main voice radio channel – the TCPW channel for TCPW and the TRAX talkgroup for TRAX. The dispatchers (or coordinators/supervisors) for these organizations simply transmit and receive through those control stations to communicate with field users. These control stations do not provide features beyond transmission and reception of voice calls.

<p>Takeaway</p> 	<p>The TCSO Dispatch Center includes three positions of Motorola MIP5000 dispatch consoles. This equipment is no longer available from Motorola and support (service or repairs) for it will become increasing difficult. These dispatch consoles use control stations to transmit and receive calls on a number of channels including TCSO’s primary channel, the channels of other “partner/neighbor” agencies, and interoperability channels. Dispatchers of TCPW and TRAX use single-channel control stations that operate on their agency’s primary/dispatch channel.</p>
	<p>Replacing the existing TCSO dispatch consoles with equipment that provides at least the same functionality but that is current/supported by its manufacturer should be a goal of a future system.</p>

3.6. Voice Radio Interoperability in Tehama County

A common definition of interoperability, as it applies to two-way radio voice communications for public-safety/public-service use, is:

Interoperability allows emergency management, response, and recovery personnel and their affiliated organizations to communicate within and across agencies and jurisdictions in real time, when needed, and when authorized.

When agencies are not all users of one, common radio system, there are a number of technical methods available to allow interoperability among them. These include dispatch-controlled interoperability methods such as:

- Dispatch Monitoring: A dispatch center monitors the daily use channel of subscribers of other agencies (and that dispatch center can call transmit on the channel, if needed). For example, TCSO currently actively monitors the “neighbor/partner” agency channels listed above but very rarely, if ever, transmits on those channels.
- Foreign Caller: Dispatch does not monitor the daily use channels but the users of an outside agency may select a dispatch center’s daily-use channel to contact a dispatcher. For example, USFS Lassen does not monitor the TCSO radio channel but the radios of TCSO deputies are programmed with the USFS Lassen channel and TCSO deputies may select that channel to talk to USFS Lassen radio users.



- Patching: Depending on the capabilities of the dispatcher center equipment, a dispatcher may be able to patch two channels together. A patch allows a dispatcher to connect two or more channels so that transmissions on one are carried on the other(s). This is useful in cases where a dispatcher wishes to quickly provide communications between two or more organizations without requesting them to all change their selected channel. The MIP5000 dispatch consoles at the TCSO Dispatch Center have the capability to patch channels together but they are not currently configured to allow this operation.

Interoperability can also be enabled by radio users through methods such as:

- Cross Programming: The subscribers are programmed with each other's daily use channels (scanning is up to the capabilities of each radio and the discretion of each user) and users of those radios may select another agency's channel to transmit to their users. For example, a TCSO deputy may select the radio channel of Red Bluff Police Department to talk to Red Bluff PD officers.
- Scanning: Subscribers are configured to receive and monitor a set of other channels that match the capabilities of the subscriber radios (i.e., radios that are capable of operating only on analog, conventional, VHF channels can only be able to scan like channels). When activity on one of the scanned channels occurs, it will be heard by the radio's user. This allows the user to have situational awareness of the activities of other agencies. [Note: TCSO deputies do not use the scan capabilities of their subscriber radios but instead typically have a separate, secondary scanner installed in their vehicles for the same purpose.]

As part of our effort to understand and document voice interoperability for TCSO, TCPW, and TRAX, we spoke with the "neighbor/partner" agencies of Red Bluff Police Department, Corning Police Department, Corning Fire Department, Red Bluff Public Department of Public Works, Corning Department of Public Works, CalFire, USFS Mendocino, and CalOES (California Office of Emergency Services)⁸.

It is important to note that all of these "neighbor/partner" agencies are on separate systems but they all use the same radio technologies as TCSO and TCPW, namely VHF analog conventional radio channels.

In our discussions with those agencies, we sought to understand the methods and importance of interoperability with TCSO, TCPW, and TRAX. We also sought to understand how any possible changes to the systems of TCSO, TCPW, and TRAX could positively or negatively affect interoperability.

From our discussions, we understand the following:

- Regarding interoperability among TCSO and its "neighbor/partner" public safety agencies:
 - Most of the user radios of the "neighbor/partner" public safety agencies, along with the user radios of TCSO, are cross-programmed with each other's primary/dispatch

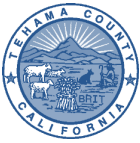
⁸ Requests were also made for radio-related discussions with Red Bluff Fire and USFS Lassen but responses from those organizations were not received.



channels. This includes the radios and the channels of TCSO, Red Bluff PD, Corning PD, USFS Mendocino, USFS Lassen, and CalFire.

- Most of the dispatch centers of the "neighbor/partner" public safety agencies, along with the TCSO, Dispatch Center, monitor each other's primary/dispatch channels. This includes the radios and the channels of TCSO, Red Bluff PD, Corning PD, and CalFire.
 - The exception to the above statements is the dispatch center at USFS Mendocino. That dispatch center does not monitor the primary/dispatch channels of TCSO of other local "neighbor/partner" public safety agencies, however, subscriber radios of TCSO and the other agencies are cross-programmed with the USFS Mendocino channels and users from those agencies can select those channels to call out to USFS Mendocino resources, if necessary⁹.
 - Although the various public safety dispatch centers have the capabilities to do so, they rarely, if ever, transmit on the primary/dispatch channels of their "neighbor/partner" public safety agencies.
 - Likewise, although the dispatch console equipment at the various public safety dispatch centers have the capabilities to do so, they are either not currently configured for or the configuration exists and is not used, they do not patch their primary/dispatch channels to those of their "neighbor/partner" public safety agencies.
 - In cases where staff at one dispatch center need to talk to the staff of another dispatch center, they will place a telephone call in order to facilitate any necessary coordination. Coordination between dispatch centers is not conducted via radio channels.
 - As noted, TCSO vehicles use a separate, secondary scanner inside their vehicles to scan the channels of their "neighbor/partner" public safety agencies. This means they do not have the capability to scan those channels when not in their vehicles.
- Regarding interoperability between TCSO and TCDWP: TCSO Dispatch does monitor the TCPW channel but rarely, if ever, transmits on it. TCPW dispatchers do not monitor the TCSO channel. Representatives from TCPW did state a desire to be able to receive and transmit on the TCSO channel to allow joint response to a situation that requires resources from both agencies (for example, a highway traffic incident that requires public works equipment to clear materials). Should there need to be coordination between TCSO and TCPW field users, it would not be facilitated by direct radio-to-radio calls but, instead, by a telephone call between the TCSO and TCPW dispatchers who would each use their radio channels to communicate with those field users.
 - Regarding interoperability between TCSO and TRAX: TCSO does not monitor the TRAX channel. Should there need to be coordination between TCSO and TRAX field users, it would not be facilitated by direct radio-to-radio calls but, instead, by a telephone call between the TCSO and TRAX dispatchers who would each use their radio channels to communicate with those field users.

⁹ It is assumed that a similar arrangement exists with USFS Lassen, however, that assumption was not confirmed.



- Regarding interoperability between TCPW and TRAX: Neither dispatch center monitors the others’ channel. Should there need to be coordination between TCPW and TRAX field users, it would not be facilitated by direct radio-to-radio calls but, instead, by a telephone call between the TCPW and TRAX dispatchers who would each use their radio channels to communicate with those field users.
- Regarding interoperability between TRAX and its “neighbor/partner” public safety agencies (e.g., Red Bluff PD or Corning PD): None of the involved dispatch center monitors the others’ channel. Should there need to be coordination between TRAX field users and users from its “neighbor/partner” public safety agencies, it would not be facilitated by direct radio-to-radio calls but, instead, by a telephone call between the TRAX dispatchers and the dispatch centers of the “neighbor/partner” public safety agencies who would each use their radio channels to communicate with those field users.
- Regarding interoperability between TCPW and its “neighbor/partner” public service agencies (e.g., Red Bluff PD or Corning PD): The same situation holds for this interoperability scenario as exists for TRAX and its “neighbor/partner” public safety agencies.

The following figure is a matrix that depicts the methods of interoperability that exist between the field users (“subs”) and dispatchers of TCSO, TRAX, and TCPW (shown along the left edge of the matrix) and their neighboring/partner agencies.

Figure – Interoperability Matrix for TCSO/TRAX/TCPW

Agencies /Methods	RBPD		RBFDP*		RBDPW		CPD		CFD		CDPW		CalFire		USFS Mendo		USFS Lassen*		
	Disp	Subs	Disp	Subs	Disp	Subs	Disp	Subs	Disp	Subs	Disp	Subs	Disp	Subs	Disp	Subs	Disp	Subs	
TCSO Subs																			
TCSO Dispatch																			
TRAX Subs																			
TRAX Dispatch																			
TCDPW Subs																			
TCDPW Dispatch																			
Dispatch Driven		Dispatch Monitored: The dispatch center monitors the daily-use channel of subscribers (and that dispatch center call transmit on the channel if needed)																	
		Foreign Caller : Dispatch does not monitor the user’s daily use channels but the users may select the agency’s daily-use channel to contact a dispatcher																	
		Dispatch Phone to Phone : Dispatch centers call each other to coordinate incidents & resources																	
User Driven		Cross Programmed : The subscribers are programmed with each other’s daily use channels																	
		Scanning: Radios monitor the channels of other systems/agencies (TCSO mainly uses separate, vehicle-mounted scanners; not their two-way radios)																	
blank		No direct communications available																	



Takeaway



The commonality of analog, conventional, VHF technologies among TCSO and their “neighbor/partner” agencies allows easy interoperability through methods such as dispatch monitoring, foreign radio calling, and cross programming. Other available methods such a patching and scanning (on the same radio as used for calls) are available but not used. Still, inter-agency coordination rarely, if ever, occurs on the primary/dispatch channels of TCSO and their “neighbor/partner” agencies; it more regularly occurs on telephone calls between their dispatch centers who then relay information to each involved agency. Voice radio interoperability methods beyond inter-dispatch-center phone calls are either not available to, or not used by, TCPW and TRAX.



Continuing the currently high levels of interoperability among TCSO and its neighbor/partner law-enforcement agencies is important for a future system. Increasing the amount of interoperability between TCSO, TCPW, and TRAX should be evaluated.

As noted, most of the systems and channels described above use a common technology namely analog, conventional, VHF. The exception is the system/channel used by TRAX which is a subscription-based, DMR digital trunked system. There is also one other system of a different technology in Tehama County, the State of California’s California Radio Interoperable System (CRIS). None of the agencies that are the focus of this report (TCSO, TCPW, and TRAX) currently use the CRIS system nor do any of the “neighbor/partner” public safety agencies that we interviewed, however, a brief description of it is provided below.

CRIS is described at a very summary level in this report in order to inform stakeholders of its general purpose, capabilities, and costs. Subsequent reports will evaluate its relevance as a possible radio system for TCSO, TCPW, and/or TRAX.

The CRIS system is being deployed as a statewide radio system by the California Governor’s Office of Emergency Services (CalOES). It is intended to be statewide system that serves California’s public safety agencies and that allows those agencies to interface their “similar, local systems throughout the state of California” to, upon full development, provide “radio coverage to 90% of the State’s population and over 60% of the State’s geographic footprint.”¹⁰

Representatives from CRIS stated that the users of the system are not yet fully established but they are working to engage as primary users on the system “the big public safety state agencies into CRIS (CHP, Cal Fire, P&R, DOJ, and others) as well as the smaller public safety state agencies that need expanded coverage but do not have the budget to build their own infrastructure.” They also stated

¹⁰ Facts about CRIS are taken from its home web page ([https://www.caloes.ca.gov/cal-oes-divisions/public-safety-communications/radio-communications-branch/california-radio-interoperable-system-\(cris\)](https://www.caloes.ca.gov/cal-oes-divisions/public-safety-communications/radio-communications-branch/california-radio-interoperable-system-(cris))) and from emails exchanged with representatives of CalOES.



they “are also in discussion to link to other regional communications systems and local public safety departments.”

The CRIS system uses Project 25¹¹ (P25) digital trunked technology in the 700MHz radio band and is a subscription (i.e., fee for service) system. Per CalOES’ website, the fee structure for use of CRIS for 2021/2022 is \$26.00 per radio per month for agencies that wish to operate primary/dispatch channels/talkgroups on the system. Use of interoperability (or mutual aid) channels/talkgroups is free. (There is also a fee of \$250.00 to activate a group of radios for use on CRIS.) Users of the system must also purchase their own user/subscriber radios and dispatch-center equipment. They must also follow CalOES’ policies regarding usage of CRIS (which are posted on the CRIS website).

Tehama County is part of Phase 2, the North Valley Phase, of the deployment of CRIS¹². This Phase is considered “In Progress”. At this time, CRIS has one operational radio sites in Tehama County at Tuscan Butte with nearby sites at South Fork Mountain (northwest of Redding) and Bloomer Mountain (east-southeast of Chico). Representatives from CalOES provided the following map of CRIS’ sites in and around Tehama County and which includes the locations of the three sites listed previously as well as a depiction of the coverage they are predicted to provide, however, no description of the coverage scenario (i.e., mobile or portable, DAQ level, etc.) is included.

¹¹ Project 25 (or “P25”) is a standard for digital radio that was developed by the Association of Public Safety Communications Officials (APCO) and that is supported by most radio manufacturers. P25 systems can be deployed in any frequency band typically used by public safety (VHF, UHF, 700MHz, or 800MHz) and can be deployed as conventional or trunked systems. P25 defines sets of signaling standards for the interfaces between various system components (user radio to system, dispatch console to system, etc.) so that equipment that complies to the standard can work with other compliant equipment, regardless of manufacturer, to deliver an established set of features. Those features have also been defined by APCO and include the operations typically sought by public safety users (transport of radio user ID, emergency notification, etc.).

¹² Phase 2 of CRIS’s deployment follows Phase 1, the Central Valley Phase, reaching from Kings County to Sacramento, which is considered “Completed” and which includes 6 radio sites. Phase 2 also includes deployment in the Bay Area and Tri-County (San Diego Area) Regions. Subsequent phases include 3 (the Central Cost Region), 4 (the North Coast and Southern Border Regions), and 5 (the Inland Region).

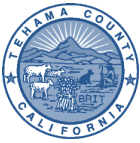
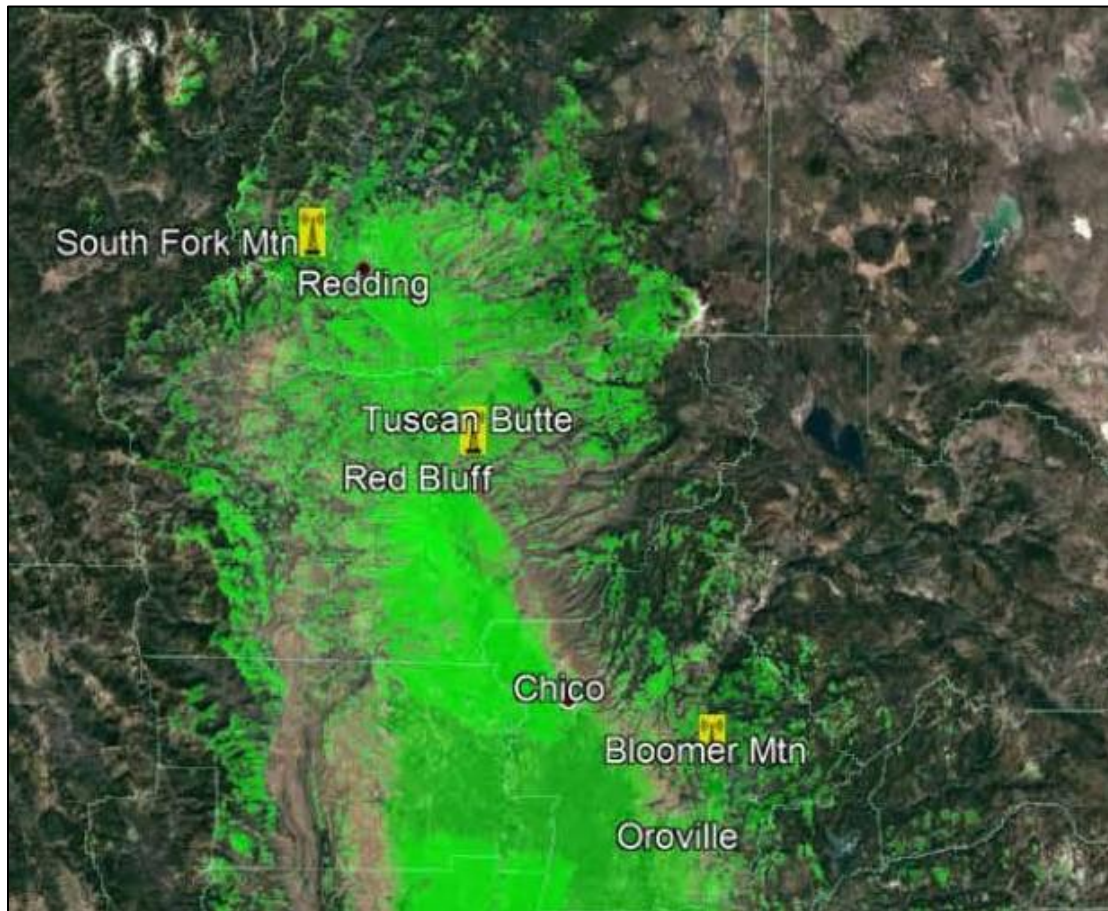


Figure – CalOES-Provided Coverage Prediction Map for North-Valley CRIS Coverage



According to representatives from CRIS, local agencies will be able to expand the coverage of the system that is delivered by CalOES-provided sites by interconnecting locally-owned sites (which would connect to the system controllers of the CRIS system) or their locally-owned systems. Detailed discussions about the costs and other expectations of local-CRIS interconnections did not occur.

Again, the point of describing CRIS in this report is to provide an overview of a statewide initiative for public safety voice-radio interoperability that is currently in progress of deployment.



Takeaway



CRIS is an initiative of CalOES to deploy a statewide voice radio interoperability system to serve both state- and local-level agencies. It is currently in deployment in and around Tehama County. It uses a different set of technologies than those used by TCSO, TCPW, TRAX, or any of their “neighbor/partner” agencies and it is a fee-for-service system. There are primary ways in which the users of Tehama County could, in the future – these are:

- 1) As-is (with the coverage delivered by CalOES-provided sites) for interoperability use – such use would be at no subscription cost but would require radios that operate in the 700MHz band (perhaps in addition to a radio frequency band that is used locally for primary/dispatch operations, such as VHF)
- 2) As-is (with the coverage delivered by CalOES-provided sites) for primary/dispatch use - such use would include a subscription cost and would require radios that operate in the 700MHz band
- 3) As-improved (with the addition of locally-owned sites to the CalOES-provided sites) for primary/dispatch use - such use would include a subscription cost, would involve the costs to deploy local sites and interconnect them to CRIS, and would require radios that operate in the 700MHz band

These options, along with their benefits and costs, will be explored in greater depth in future reports.

3.7. Tehama County Inventory of Subscriber Radios

Throughout this report terms “subscriber radio”, “user radio”, and “field radio” are used to describe the portable (handheld) and mobile (vehicular-mounted) radios used by field personnel of the public safety and public service organizations in Tehama County. The subscriber radios used by TCSO and TCPW vary in quantity, manufacturer, and model, however, all are capable of the basic technologies of analog, conventional, and VHF. The subscriber radios used by TRAX are capable of operating on digital/DMR, trunked, UHF systems such as the one operated by Day Wireless at Cohasset Ridge.

To collect the inventories of subscriber radios in used by TCSO, TCPW, and TRAX, representatives for each organization were contacted. The following table shows the inventory as it was collected from those representatives. Along with listing the manufacturer and model of the various radios, the table specifically notes if that radio model is still a current model (i.e., if it is still being produced by the manufacturer). During interviews with the user organizations, it was reported that most radios used by TCSO are capable of supporting the bursty-data (“MDC1200”) features of emergency and unit-ID; however, they are not programmed to do so.

The purpose of collecting and recording this information is to establish a baseline of current radio counts and capabilities so that, as alternatives for expansions to the existing system are developed in our subsequent reports, the impacts/costs of replacement or upgrades to subscriber radios can be included in their analysis.



Table – Inventory of TCSO, TRAX, and TCPW Subscriber Radios

Organization	Radio Information					
	Type	Manufacturer	Model	Quantity	Use	Radio Model Status
Tehama County Sheriff's Office						
	Mobile	Kenwood	TK-5720	34	Patrol & Admin Vehicles	Active
	Mobile	Motorola	XTL2500	16	Patrol & Admin Vehicles	Discontinued
	Mobile	Various Motorola & Kenwood - Older Models		11	In Process of Being Phased Out	Discontinued
	Portable	Motorola	XTS2500	65	Patrol & Admin Use	Discontinued
	Portable	Motorola	APX6000	11	Patrol & Admin Use	Active
	Mobile & Portable	ICOM	2720	27	Search & Rescue	Discontinued
	Portable	Motorola	XPR3500e	31	Correctional Staff	Active
TRAX						
	Mobile	Motorola	XPR4550	1	Dispatch	Discontinued
	Mobile	Motorola	XPR4550	16	Transit & Paratransit Use	Discontinued
Tehama County Department of Public Works						
	Mobile	Motorola	CP300	61	DPW Vehicles	Discontinued
	Portable	Motorola	CP200	15	Extra-Vehicle Work	Discontinued
	Control Station	Motorola	VXR7000	1	Geber Base/ Dispatch Radio	Active

Takeaway



The agencies of TCSO, TCPW, and TRAX use an array of different subscriber radios, most of which are capable of only the technology of their current radio system and many of which have been discontinued by their manufacturer. This discontinued status may make support (service and/or maintenance) more difficult or more expensive.



3.8. Conditions of Tehama County Radio System Sites

This section of this report describes the current condition of radio sites of Inskip Butte, the TCSO Dispatch Center, and the TRAX Dispatch Center. Descriptions include the sites' shelters, equipment rooms, and towers. To complete this evaluation, CDX Wireless visited and evaluated ("walked") those sites in early 2021.

This section includes summaries of findings and recommendations for issues related to these three sites. Full site-walk forms for them have been prepared and are included in Appendix B of this report.

The site at Rancho Tehama Reserve was not available for a site walk. The site at Cohasset Ridge, used by Day Wireless for their DMR system which TRAX uses on a subscription basis, was also not walked because its conditions are under the control of Day Wireless. Other sites house lower-power control-station radios and, while they are important, their conditions are not as critical to the operation of the current system as are the conditions of sites such as Inskip Butte (which can be considered a system-level radio site); therefore, they were also not walked.

The condition of a radio site (including the grounds, shelter, and tower) can have significant impact on the radio system it supports. The following aspects of site conditions are considered of primary importance to the optimal performance of the radio components housed within:

- Access/Approach (Is access to site un-obstructed?)
- Physical Security (Are locks, gates, video surveillance present?)
- Equip Room Grounding (Is there a common ground bus tied to earth and is equipment connected to it?)
- Transmission Cable Entry Ports (Are ports present and sealed or booted?)
- Fire Protection (Is fire protection system present and working? Are batteries, if present, covered?)
- Rack Security (Are racks bolted to ground?)
- HVAC (Are heating and cooling systems present and working?)
- Main Power (Is radio equipment on separate panel(s) and are they well marked?)
- Backup Power (Is there sufficient UPS, battery, and/or generator power?)
- Tower Structure / Loading (Does the tower structure appear sufficient for current antennas?)
- Tower Grounding (Is tower properly grounded?)
- Antennas & Lines (Are lines and antennas in good condition?)
- Lightning Arrestors (Are lightning suppressors in place at site entry?)

These aspects as listed above are noted in detail in the full site-walk forms (Appendix B) and summarized below.

3.8.1. Inskip Butte

The Inskip Butte site is a repeater site for the TCSO and TCPW repeaters. The site is located within a potential earthquake zone and potential forest fire zone with trees within approximately 30 feet of the shelter.



Overall shelter facilities are in fair condition. The shelter does not have an industry-standard cable entry port, but instead has holes drilled through the shelter wall with transmission lines running through them. Equipment within the shelter is not bolted/mounted to the floor and is not bonded to ground. Considering that Tehama County is in an active fault area, the County should bolt and brace the racks as appropriate to prevent tipping during seismic activity. Also, there appears to be no internal grounding system present and none of the equipment appears to be fully grounded. Improving internal grounding is advised to electrically protect system equipment.

The tower is a 90' guyed tower and the size and quantity of antennas on this type of tower and configuration appear adequate and do not appear to present a loading issue. The tower is grounded using a connection with screw-on mechanicals connectors. Industry standards dictate irreversible crimps or cad-welded connections. Changing from the current connection method to one of the standards could prevent a future failure of tower grounding. Also, the grounding buss bar used to ground the antenna transmission lines near the tower base has a mechanical screw connection to the ground and that screw is corroded, potentially preventing a proper ground for the antenna lines.

There is a backup-power diesel generator onsite. It was reported that it is run every two weeks however it was also reported that it was installed in 1967. A newer, replacement generator is advised.



While none of the issues noted above are critical to the security of the site or the performance of the system, improvements to the Inskip Butte site's cable entry port, internal grounding, transmission line grounding, rack mounting, tower grounding, and backup generator will be carried forward as requirement in our plans and budgets for an upgrade to or replacement of the two-way radio systems.

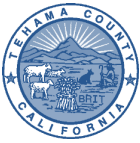
3.8.2. TCSO Dispatch Center

The TCSO Dispatch Center is located within the TCSO Jail facility and includes the actual area of the TCSO Dispatch Center (the room in which TCSO dispatchers operate) as well as an equipment room on the second floor of the TCSO Jail facility. Together, these two rooms house dispatch console equipment and the control station radios that connect the dispatch consoles to the radio system.

The radio equipment shelter on the second floor of the Jail facility is an interior room and is in overall good condition. The grounding in the room is, however, not connected to exterior ground. There is an interior ground buss but grounding of racks and equipment is haphazard and generally not complete. It was noted that the control station rack has a grounding lug attached but there is no grounding conductor inserted. Lightning arrestors are installed on incoming antenna lines but they are not bonded to any type of ground conductor. Additionally, there is not a standard cable entry/exit port. Instead, antenna lines enter the building through holes drilled into the building's exterior.

The rack that houses the control stations is secured to the floor with a single uni-strut channel that is anchored to the wall and that extends to the top of the rack. This rigid bracing would not give during a large seismic event and would likely result in the anchors being ripped free with the rack toppling. This bracing also does not provide lateral stability.

The equipment in the equipment room operates off of commercial AC power which is backed-up by an on-site generator.



There is an (approximately) 20-foot, self-supporting (non-guyed) tower on the top of the building. The antennas for the dispatch consoles control station radios are mounted on that tower and we have concern that there are too many antennas and lines for the tower’s design and construction. During our evaluation, the tower was seen to be swaying in the presence of light wind.

	We highly recommend that a tower structural analysis be completed with subsequent structural improvements implemented to increase tower stability.
	Beyond the tower’s structural stability, none of the issues noted above are critical to the security of the site or the performance of the system. Improvements to the TCSO Dispatch site’s cable entry port, internal grounding, transmission line grounding, and rack mounting will be carried forward as requirement in our plans and budgets for an upgrade to or replacement of the two-way radio systems.

3.8.3. TRAX Dispatch Center

The TRAX Dispatch Center is located at the TRAX/ParaTRAX bus garage in Red Bluff, CA.

The radio equipment at this site is a single control station radio. It operates from the facility’s main AC power source and there is no backup power. The building and the room in which the radio is located are in overall good condition. There is no main grounding in the room in which the radio is located. The antenna line for the control station does not have grounding or lightning arrestors and the cable does not exit via a standard cable entry/exit port but through a hole that is drilled into the building’s exterior.

The antenna for the single control station radio used by TRAX dispatch is mounted to the building structure. While the mounting hardware for the antenna is in good condition, there is no visible grounding or lightning protection present on the antenna. The Red Bluff Municipal Airport is within one-half mile of the TRAX Dispatch Center, thereby limiting the height of any tower that could be located at the facility.

	The conditions of the TRAX Dispatch Center are generally adequate for the installation of one control station radio and do not require any immediate remediation. Improvements to the TRAX Dispatch site’s cable entry port, internal grounding, transmission line grounding, and antenna grounding will be carried forward as requirement in our plans and budgets for an upgrade to or replacement of the two-way radio systems.
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3.8.4. Summary of System-Level Site Conditions

Overall, the sites used within the County’s systems appear to be serviceable. Although issues are cited throughout this section regarding system installation standards and site conditions, it is important to note that many of the sites CDX Wireless visits through the course of its various projects have many of the same issues. It is a matter of education on proper industry installation practices and a concerted effort on the part of Tehama County to commit to fixing known issues in accordance with today’s industry standards.



CDX Wireless highly recommends that sites be constructed and maintained to the standards and guidelines contained in Motorola's Standards and Guidelines for Communication Sites, commonly known as R56. This reference covers all major aspects of site design and installation to help maximize equipment availability, reliability, and safety. Additional resources listed below have installation standards and guidelines related to grounding and lightning protection:

- Harris Corp's Site Grounding and Lightning Protection Guidelines (AE/LZT 123 4618/1)
- NFPA's Standard for the Installation of Lightning Protection Systems (NFPA 780)
- TIA's Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises (TIA-607)

CDX Wireless highly recommends that an overall approach to installation, grounding, and surge suppression should be developed in accordance with the above referenced industry installation practices for all future installations. This approach should then be used to rectify current installations to aid in increasing overall system performance, increase overall safety and potentially increase longevity of installed equipment.

This approach should be further expanded at any future sites where the County fully owns and operates the site, to develop an overall site plan to strategically place RF equipment to maximize space, allow for expansion, and provide a safe working environment.

3.9. Radio System Support



Support of the types of radio systems and equipment described above includes repair of equipment that experiences failures, maintenance of equipment to monitor its performance and conduct preventative alignments, and occasional reprogramming of equipment to meet changing user needs.

For TCSO, TCPW, and TRAX, support of their radio system equipment is divided between various organizations as follows:

- Support of the TCSO and TCPW radio-site (repeaters) and dispatch site (dispatch consoles) equipment is provided by Valley Industrial Communications, a commercial (privately owned) service center for various manufacturers' products based out of Redding, CA. Per our discussions with TCSO and TCPW representatives, Valley Industrial Communications is typically engaged only in cases of repair of failed equipment and they do not regularly provide preventative maintenance or reprogramming services.
- Support of the TRAX radio system infrastructure is provided by the owner/operator of the radio site at Cohasset Ridge, Day Wireless.
- Support of the subscriber radio equipment used by each organization is provided by representatives of that organization. From our discussions with each organization, we learned that the organizations' subscriber-radio support is generally limited to replacing a failed radio with a spare and then engaging either Valley Industrial Communications (for TCSO and TCPW) or Day Wireless (for TRAX) to repair the failed unit.

Since much of the infrastructure and subscriber-radio equipment currently in use by TCSO, TCPW, and TRAX has been discontinued by their manufacturers, the costs of its service is likely to be more expensive in coming years and will eventually become totally unavailable.



<p>Takeaway</p> 	<p>Service of the existing radio system infrastructure and subscriber radio equipment is generally reactive (fixing components that are broken) and decentralized (each agency utilizes different resources) but it is generally viewed as adequate.</p>
	<p>Ensuring that any future replacement or upgraded radio system has an appropriate and cost-effective set of support and maintenance services will be important to its long-term sustainability.</p>

3.10. User Organizations’ Input to Radio Operations

3.10.1. Methods of Collecting Input

To gather information regarding needs for improvement to the current TCSO, TCPW, and TRAX radio systems, CDX Wireless contacted representatives from the various organizations that use the current system. Contact was accomplished via two methods: i) an on-line survey and ii) interviews that were conducted either face-to-face or via phone conference. Both methods sought to gather answers to the same questions about how well the system, in its current configuration, meet user needs regarding the system performance attributes of coverage (the ability to make or receive calls in all areas of operation), capacity (the ability of the system to carry calls without users talking over each other), channel selection (knowing which channel to use), channel scanning (monitoring other channels for situational awareness), usability (ease of operations of radio equipment), desired capabilities (possible features for a future system), interoperability (the ability to communicate between agencies or jurisdictions), service (upkeep and repairs of failures), and other aspects of system performance (concerns not addressed by other topics). The online survey asked questions in an open-ended format.

The on-line surveys were open from May 03, 2021 to May 21, 2021 (three weeks) to the following organizations who provided the following levels of participation:

- Tehama County Sheriff’s Office (TCSO): 18 participants
- Tehama County Public Works (TCPW): 2 participants
- TRAX: 19 participants

Additionally, interviews that were conducted between March and July, 2021 and they covered the same topics as the surveys, however, they were conversational in nature and thus allowed the collection of additional information. Face-to-face or telephone-based meetings were conducted with representatives the same stakeholder agencies as included in the survey.

3.10.2. Results of Surveys and Interviews

A summary of results of the surveys and interviews are presented in the following table. In almost all cases, the input received was consistent from all sources and, therefore, can be presented as comments that are “representative” in that they are the typical or most-commonly provided responses. In two



instances there was some diversity in responses and that input is shown in italics. The full and direct set of responses to the survey are included in Appendix C of this report.

Table – Results of Surveys and Interviews of TCSO, TRAX, and TCPW Regarding Voice Radio

Topic and Question	Agency	Typical/Summary Response(s)
COVERAGE In what areas do you experience coverage problems? List as many as you can think of. Please note if the problems occur when you are using your handheld or vehicular radio (or both). <u>SEE FIGURE FOLLOWING THIS TABLE FOR GRAPHIC OF TCSO-REPORTED COVERAGE PROBLEM AREAS.</u>	TCSO	<ul style="list-style-type: none"> • Problems in Los Molinos & Rancho Tehama • Problems on Hwy 36 East, especially Mineral and Manton • Problems inside buildings, including in the TCSO building and Walmart • Problems in boats on river, especially in canyons • Interference heard often on handhelds, including when two radios are near each other • Also problems in Gerber, Paskenta, Vina, Platina, Tehama, Orland, Bowman, Cottonwood, Antelope, Jelly's Ferry, and Payne's Creek • Interference (skip) from distant agencies using our same frequency (e.g., Humboldt and Mendocino Counties)
	TCPW	<ul style="list-style-type: none"> • Coverage is generally ok except in canyons, west of Red Bluff
	TRAX	<ul style="list-style-type: none"> • Coverage is generally intermittent everywhere • Some busses are good, others are bad • Intermittent coverage in Red Bluff, Diaryville, Los Malinos, Proberta, Corning, Richfeild • Generally bad coverage on 99E
CAPACITY Do you experience problems with talking over other users (or being talked-over yourself)? Under what conditions does talking-over each other happen?	TCSO	<ul style="list-style-type: none"> • Talking over each other happens only rarely; more often for Patrol and sometimes in emergency situations • When this happens, it's hard to know which radio is transmitting • It would be good to have a second channel for tactical situations
	TCPW	<ul style="list-style-type: none"> • We get bleed-over from Lincoln Fire sometimes
	TRAX	<ul style="list-style-type: none"> • We talk over each other but it's not often and it's not a big problem • It might be nice to have a second channel (but it could be hard or confusing to use)
CHANNEL SELECTION Do you know what channels to use for normal operations vs for direct operations vs for interoperability?	TCSO	<ul style="list-style-type: none"> • <i>Most answers (12 of 18) were, "yes, I know what channel to use" but others (4 of 18) were to the effect, "I sometimes have questions about which channel to use" and "I'm not sure how or when to select the Rancho site". 2 of 18 were blank or "n/a".</i>
	TCPW	<ul style="list-style-type: none"> • Channel selection is not a problem
	TRAX	<ul style="list-style-type: none"> • We have only one channel so this is no problem • It would be nice to have separate channels with the second channel for side conversations • It would be nice to have separate channels for transit and paratransit



Topic and Question	Agency	Typical/Summary Response(s)
CHANNEL SCANNING Do you use scanning frequently and, if so, does it help your operations? What channels/agencies do you typically scan? Is it easy to turn scanning off/on and to select a scan list?	TCSO	<ul style="list-style-type: none"> I have a separate scanner (or secondary radio) so I don't have to scan on my primary radio I prefer not to scan
	TCPW	<ul style="list-style-type: none"> We don't use scan
	TRAX	<ul style="list-style-type: none"> We don't use scan
RADIO USABILITY Do you know how to operate all the controls and features of your radio? Are the radios and their accessories (speaker-mics, etc.) easy or hard to operate?	TCSO	<ul style="list-style-type: none"> Most answers (12 of 18) were, "yes, I know how to use my radio" but others (5 of 18) were to the effect of, "I'm not sure what all the controls do". (1 of 18 was blank.) We've had problems with the lapel mics - bad audio on transmission
	TCPW	<ul style="list-style-type: none"> The radios are easy to use
	TRAX	<ul style="list-style-type: none"> I know how to use my radio but ... <ul style="list-style-type: none"> ... I had to figure out it myself (I was never trained) ... the accessories (mics and speakers) don't always work
POSSIBLE RADIO FEATURES What radio features would you like to be able to use in a future system?	TCSO	<ul style="list-style-type: none"> Radio ID, Emergency Button GPS-based location services Encryption Radio disable (lost or stolen radios) Dual-band radios (UHF and VHF) Bluetooth mics would be helpful
	TCPW	<ul style="list-style-type: none"> GPS-based location services Channel scanning
	TRAX	<ul style="list-style-type: none"> Separate channels for transit and PT Preset messages GPS-based location services
INTEROPERABILITY When you need to talk to someone outside of your own department, do you know how to do so on the radio? Are there any agencies that you need to communicate with via radio but that you can't? If so, who are they and what do you use to talk to them (cell phone, etc.)?	TCSO	<ul style="list-style-type: none"> We can talk to everyone we need to other than CHP (we use cell phones for that) We also can't talk to Glenn Co SO and Butte Co SO as well as Fish and Wildlife Jail staff can't talk to patrol
	TCPW	<ul style="list-style-type: none"> It would be nice to be able to talk to Sheriff's Office
	TRAX	<ul style="list-style-type: none"> We sometimes need to talk to Sheriff or police officers and we use cell phones for that - it would be nice to talk to them via radio We rely on dispatch to pass along info to others (like Sheriff)



Topic and Question	Agency	Typical/Summary Response(s)
SERVICE How well and how quickly are your requests for maintenance/service, either to issues with the system or your radios, addressed?	TCSO	<ul style="list-style-type: none"> Service is generally pretty quick There are system-level issues (coverage, reliability) that need to be addressed
	TCPW	<ul style="list-style-type: none"> Service is timely
	TRAX	<ul style="list-style-type: none"> Service is usually quick
OTHER What else should we know about the radio system including how it could be improved in the future?	TCSO	<ul style="list-style-type: none"> Coverage and audio quality needs to be improved The system and the equipment need to be continually updated and maintained
	TCPW	<ul style="list-style-type: none"> Adding GPS would be nice
	TRAX	<ul style="list-style-type: none"> Just make coverage and conversations more reliable across the whole area The whole system needs an upgrade so we don't have to use cell phones in so many areas

The following figure is a graphical representation of the locations reported as coverage problem areas by the Tehama County Sheriff's Office (black "pin" icons represent areas reported to have poor coverage). (This map uses as its base the coverage prediction of 95% talk-in and talk-out coverage to/from the TCSO site at Inskip Butte to a portable radio operated on streets with a delivered audio quality of 3.4 (i.e., Map 2 from Appendix A).)

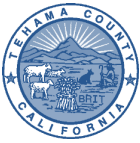
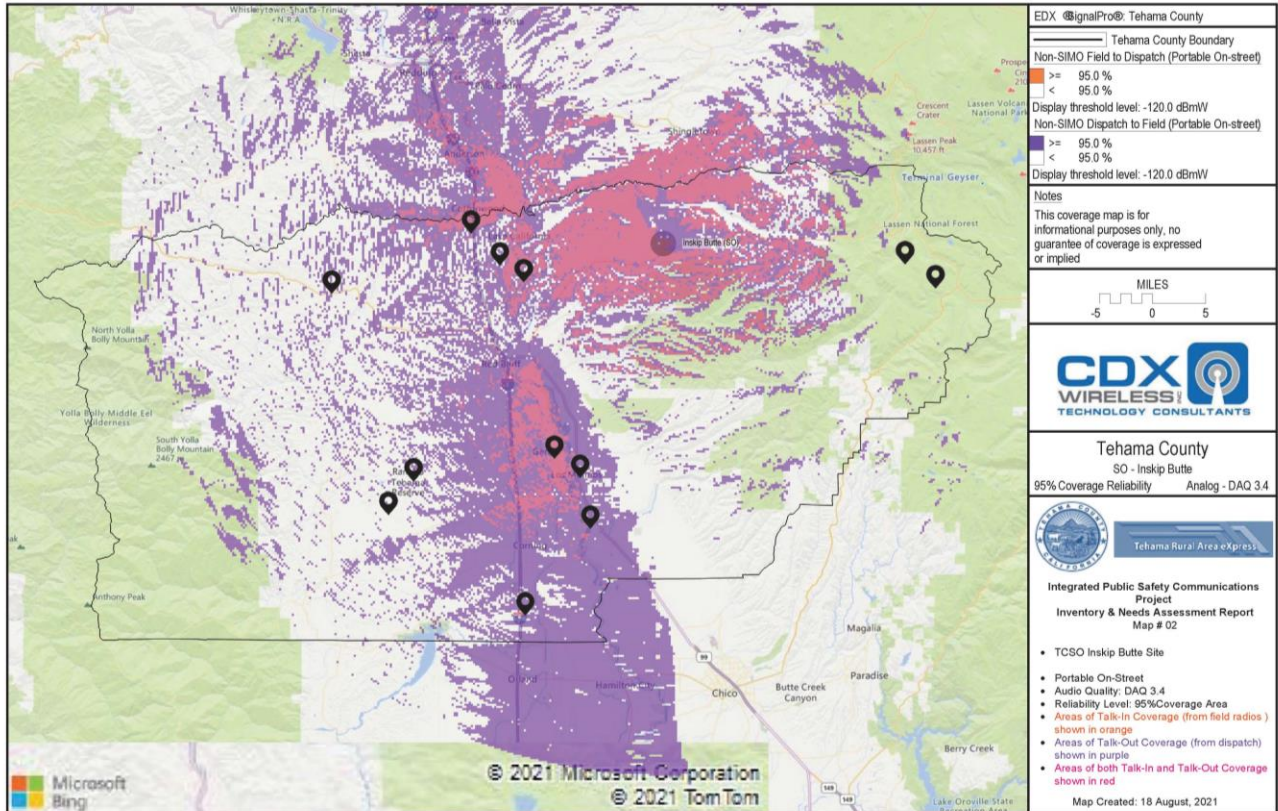


Figure – Locations of TCSO Reported Coverage Problems



3.10.3. Survey Summary

The following are the Takeaways, Immediate Actions and Carry-Forward Recommendations based on our interviews and the results of the survey:



Problems with coverage were the most-reported, and most emphatically reported, issues with the current systems by all three user groups. Improving radio coverage for TCSO, TCPW, and TRAX is an important goal for a future system.

There was also general concern for the age and viability of the existing system. Service of the existing equipment was viewed as timely and complete but there was recognition that the components are old and may be reaching the end of their maintainability.



- Improving awareness of how and when to select the TCSO Rancho Tehama Reserve site/channel could improve perceptions of coverage as well as TCSO operations in the area.
- Providing a refresher course on radio features and operations to TRAX users could eliminate some confusions some operators have about radio controls.



- As noted in the Takeaway, coverage improvements are needed in a future system. In addition to simply providing more coverage in specific areas, attention should be paid to enabling coverage on a county-wide basis (so that calls from one user can be heard and replied to users from other areas of the county).
- Both TCSO and TRAX noted that having a second channel (for tactical operations for TCSO and for a split between fixed-route and paratransit for TRAX) would be beneficial.
- All user organizations felt new features, mainly GPS-location services, would help their operations. Other requested features for a new system included:
 - For TCSO: Radio ID, Emergency, and Encryption
 - For TCPW: the ability to talk to TCSO and to scan other channels
 - For TRAX: 'canned' messages'
- Interoperability, through the common platform of analog, conventional, and VHF technologies is seen as good but there were requests for additional capabilities including, for TCSO, the ability to talk to others outside of the county (CHP, Glenn County, Butte County).

4. Review of TCSO and TRAX Dispatch Applications

Beyond using voice radio for communications for dispatch, TCSO and TRAX also use different computer applications (also referred to as programs) to collect, prioritize, and manage the information exchanged between dispatchers and field users. TCSO uses a Computer Aided Dispatch (CAD) application for these purposes (as well as for tasks that do not involve radio operations such as reports) while TRAX uses a scheduling/prioritization program for managing the operations of its ParaTRAX service. (ParaTRAX is a



dial-a-ride transit service in the greater Red Bluff area for seniors 65 and older and persons with disabilities.¹³⁾ TCPW does not use any similar application for dispatcher operations.

This section of this report provides an overview of the TCSO CAD and TRAX ParaTRAX scheduling/prioritization applications by describing their features, their architectures, and user feedback on their performance.

4.1. TCSO CAD Application

The Tehama County Sheriff's Office uses the RIMS CAD application from Sun Ridge Systems, Inc. This CAD application has been in use by TCSO since 2016 and all three dispatch positions at the TCSO Dispatch Center all have workstations that support use of RIMS.

RIMS supports data entry and data access for creating a new incident upon receipt of a 9-1-1 call or an inquiry or update from a Deputy. It provides directed questions for the call-taker/dispatcher to follow to ensure incident creation follows policies and best practices. It also supports various methods of search including for details on a person, evidence, location, incident/case, or various other items. As an incident is created, RIMS helps the operator prioritize it among other incidents and to select the best field resources, based on their locations, availability, and capabilities; to respond to it. RIMS provides recommendations as to which resources would be best dispatched but final assignments are left to the dispatchers. Dispatchers can assign and dispatch resources at the time that enough information is collected and can continue to gather and share additional information as it becomes available.

As a field user responds to an incident, the information they gather and relay to dispatch via radio can be incorporated into the RIMS incident. Such information can include details about other people or property involved in the incident, present hazards or other officer safety information, and comments. RIMS also has interfaces to local, state, and national crime databases so that as inquiries to those databases are initiated, based on the people or items involved in an incident, the information returned is both made available to those involved and compiled into RIMS' records.

The following image¹⁴ shows a general layout of what information is collected in the creation of an incident in RIMS and how that information is viewed by a dispatcher.

¹³ Source: <https://taketrax.com/ada-services/>

¹⁴ Source: <https://sunridgesystems.com/home/applications/computer-aided-dispatch/>



Figure – General Layout of RIMS Incident Screen

Incident Entry

Location and Type
 Adrs: 305 N YOSEMITE AV
 Apt/Suite: [] City: OAKDALE Type: ALARM
 Place: BANK OF LATROBE Priority: 1

RP
 Caller: MODESTO ALARM
 Address: 1515 11TH ST Apt: []
 Phone: 209-888-9098 City: MODESTO St: CA
 RP Location: ON PHONE

Description
 Glass break, north building. Teller on phone with vehicle description. No further information.

Recommended Units

4R1	M1	P1
P19		

Nearest GPS Units

S3	S2	4R1

Vehicle
 License/State: OAKDALE1 CA Year: 0
 Make: FORD
 Model: PU
 Colors: Yellow
 VIN: []

Geo-Based Info
 Beat: A Run Card: 1 Source: T
 Map: 11 Area: 2 Contact: X
 Resp Agencies: LPD LFD LFD
 Cross Streets: E D ST/E C ST
 Weapon: []

WEAPONS FOUND PRIOR 12/13/16 Weapons

Location History			Caller History		
6/22/17	ALARM	False Alarm	6/22/17	RP	ALARM, Dispo FA (209-888-9098)
6/26/17	ALARM	Canceled by RP	6/26/17	RP	ALARM, Dispo CA (209-888-9098)
7/12/17	ALARM	False Alarm	7/12/17	RP	ALARM, Dispo FA (209-888-9098)
7/13/17	ALARM	False Alarm	7/13/17	RP	ALARM, Dispo FA (209-888-9098)

Toolbar: ProQA, Street, Premise, Save, Cancel, More to Follow, Transfer, Run Card, Map

As more and more information is added to an incident, it can be made available to others including other dispatchers at TCSO as well as to dispatchers at the neighboring dispatch centers of Red Bluff and Corning as those agencies also use RIMS. This ability to share information between agencies was noted as one of RIMS greatest advantages as it can allow quick access to more data to those who need it.

Photographs and other images can also be both collected and searched by RIMS. For example, an individual who is unwilling or unable to provide their name can be identified by the imagery of their tattoo if that person (and their tattoo) exists in TCSO’s RIMS database. For example, searching for a description such as “eagle” or “flower” will provide images of individuals with those types of tattoos.

When sufficient information is collected (and approved), RIMS allows it to be shared with the State of California’s crime database (the California Law Enforcement Telecommunications System or CLETS) as a record that others can access. RIMS can also generate and share other reports based on the outcome of an incident, based on policies and approvals. These reports are used locally and they can support the filing of reports as required by the California Department of Justice, the California Peace Officers Standards & Training (POST) Commission, and the California Department of Corrections and Rehabilitation

RIMS operates at workstations in the TCSO Dispatch Center that are connected to RIMS servers that are located within county offices. The servers operate on a storage area network (SAN) with multiple hosts that each operate virtual machines capable of taking over for each other should one experience a failure. Connections between the servers and the workstations are made via a private network that has had high reliability for the duration of RIMS use at TCSO. Connections between TCSO’s RIMS servers and those of



neighboring agencies likewise use reliable private networks as do RIMS' connection to CLETS and other crime databases.

Support for RIMS is provided primarily by Obsidian IT, an outsourced information technology company that serves Tehama County. Secondary support comes, when necessary, directly from Sun Ridge Systems, Inc. Obsidian IT is contracted by Tehama County to refresh on a regular basis the hardware of the RIMS workstations, the RIMS servers, and the underlying network on which they operate.

Representatives of the TCSO Dispatch Center were very positive about the use of RIMS. They stated that the manner in which it shares information during the steps of creating and completing an incident, including the sharing of information with neighboring agencies, greatly increased the speed and accuracy of their records. This corresponds to better and more complete information being shared more quickly with TCSO Deputies and other first responders. Representatives from TCSO also stated that support of RIMS from both sources is very good and that response times are minimal and acceptable. Updates to RIMS are provided as necessary with fixes to any discovered issues delivered quickly.

There were two noted points for possible improvement to RIMS deployment:

- It was noted that there is not an automatic link between evidence that is collected and stored by TCSO and the RIMS application. As items are secured in TCSO's evidence stores, it is bar-coded and catalogued into an EvidenceOnQ application. This information is bridged to RIMS in a way that is sometimes slow to populate RIMS and that sometimes requires manual intervention to confirm the accuracy of all data about the items.
- It was also noted that the Tehama County District Attorney does not have direct access to RIMS which means that when reports from an incident are required by the District Attorney, staff from the TCSO Dispatch Center must access them, print them, and delivery them to the District Attorney's office. According to TCSO dispatch representatives, this occurs on a daily basis. Allowing the District Attorney to have remote access, even to view and print such reports, would reduce the need for involvement by TCSO dispatchers.



The CAD application used by TCSO, RIMS by Sun Ridge Systems, is full-featured, well supported, and generally viewed as enhancing the work processes of TCSO dispatchers. It has strengths in search capabilities and it supports the ability to exchange information with neighboring agencies. It operates on up-to-date and reliable hardware and network connections that are contracted to receive regular updates. Specific enhancements were requested but, overall, representatives from TCSO dispatch have positive comments about RIMS and its support from Obsidian IT and Sun Ridge Systems.



The specific enhancements noted by TCSO dispatchers, improved interface with evidence and DA access, will be investigated as possible enhancements to RIMS.



4.2. TRAX ParaTRAX Scheduling Application

TRAX uses a relatively simple application for the scheduling of its ParaTRAX dial-a-ride rideshare program. The application is Rides Unlimited and it is used to:

- 1) Collect information about requests for paratransit rides (information such as the name, phone number, and address of the rider as well as the location of their requested destination)
- 2) Place those requests into a queue to be assigned to a paratransit vehicle/driver (i.e., marking the request as "in queue")
- 3) Manage the queue by assigning rides to a paratransit vehicle/driver (i.e., marking the request as "assigned")
- 4) Upon completion of the ride, further manage the queue by clearing the ride as "completed" (i.e., marking the ride as "done", thereby removing it from the queue).

The Rides Unlimited program is used only by TRAX's ParaTRAX scheduler/dispatcher – it does not have the capabilities to exchange information about rides between that dispatcher and drivers. Such exchanges of information are conducted via other methods including the two-way radio system used by TRAX and/or cellular phone calls. Also, the program does not provide any convenient/automated method of producing reports or statistics on rideshare use. Inquiries into past rides, either at the individual or group levels, must be completed by manually viewing/sorting all request records.

The following images show, first, the general layout of the information collected in Rides Unlimited as part of a request for service and, second, the format of the program's queue (also known as "the board") that is used to manage the requests.



Figures – General Layout of Rides Unlimited’s Request and Queue Screens

The screenshot displays the 'Rides Unlimited Data Entry - Tehama County' application window. The main form is titled 'Trip Tickets - Tehama County' and contains the following fields and controls:

- Client Information:** First Name, Last Name, Phone, Auth. wait (0).
- Pickup Information:** Pickup Address (with a search icon), Zone (dropdown menu showing 'COUNTY E'), Pickup time (0).
- Delivery Information:** Delivery Address (with a search icon), Zone (dropdown menu), Appt. time (0).
- Additional Fields:** CA 96055, GERBER, Trip type: (dropdown menu), Leg type: (dropdown menu).
- Statistical Data:** #Cli. (1), #Atndt. (0), #Esct. (0), Stat (1), Sunday (checkbox), Next leg time (0).
- Financials:** Purpose (dropdown menu), Funder (ADA), Fare (0.00), Provider (dropdown menu).
- Verification:** Verify appt., Other trans? (radio buttons for Yes and No, with No selected).
- Notes:** Printnote: (text area), Notes: (text area).
- Navigation Buttons:** Find Client, Save, Requestor, Next, Search, Not q'd yet, Clear, Done, Prev., Delete.



Integrated Public Safety
 Communications Project
 Inventory & Needs Assessment Report



DAVID GUIL	KELLY TRU	TERESA JA	1800'S	NO SHOWS	CANCELS
721 &1	977 &2	978 &2	0	0	0
					930 &, 755 LUTHER RD. #20
					DAVITA
					1800 &, 965 HIWAY 99
					275 SOLANO SUIT 501
					1800, 421 ANTELOPE BLVD
					750 DAVID AVE. #28
					1800 &, WELLNESS CENTE
					1221 BUTTE ST
					1800 &, CANCEL
					CANCEL
			1830, ST. ELIZABETH		1700 &, 275 SOLANO SUIT 5
			8168 MAREK		965 HIWAY 99
			1800 &, WELLNESS CENTE		1630, 706 PEACH ST. (RHC
			LASSEN HOUSE		8168 MAREK
			1800 &, GREENVILLE RANC		1430, 8168 MAREK
			10675 BRYNE AVE #28		706 PEACH ST. (RHC)
		1400, VISITOR CENTER	1800 &, LASSEN HOUSE		1415 &, DAVITA
		85 GILMORE RD	20925 LOPEMAN		755 LUTHER RD. #20
	1500 &, DAVITA	1400, VISITOR CENTER ON	1800, ROLLING HILLS DENT		1145, 750 DAVID AVE. #28
	20270 SIMPSON RD	VISITOR CENTER ON AVE	13045 ABBY LANE-OFF PI		421 ANTELOPE BLVD. HA
1330 &, ROLLING HILLS CA	1415, 13045 ABBY LANE-O	1315 &, 10675 BRYNE AVE	1800 &, WALMART		1015 &, 1221 BUTTE ST
846 FRANKLIN	ROLLING HILLS DENTAL	GREENVILLE RANCHERIA	750 DAVID SENIOR LIVING		WELLNESS CENTER
1300, R. H. CASINO	1330 &, LASSEN HOUSE	1245 &, LASSEN HOUSE	1800 &, LASSEN MEDICAL		30 &, CANCEL
200 JACKSON ST. #29	WELLNESS CENTER	LASSEN MEDICAL	LASSEN HOUSE		CANCEL
		1230, 455 JEFFERSON CHU			
		1030 OAK GROVE AVE			

According to input from dispatchers at TRAX, the Rides Unlimited program is adequate for its purpose but there is concern about the overall stability, serviceability, and longevity of its platform. The application currently operates on a standalone Windows XP™-based computer located at the TRAX dispatch center. The Windows XP™ operating system is no longer supported by its vendor, Microsoft, and it is unlikely that the program, being a 32-bit program, would operate on a newer, supported version of the Windows™ operating system, all of which are 64-bit based. It was also unknown if the installation media for the program is available (i.e., if it could be installed on a replacement computer should the current one experience a hardware failure). Additionally, the Rides Unlimited program was developed by the Paratransit Services company, an organization that grew out of the Kitsap (Washington) Paratransit service and that is now a “regional broker for Non-Emergency Medical Transportation for the State of Washington (we now cover nine western counties), and also operate public transit systems in the states of Washington, Oregon, and Northern California.”¹⁵ The Rides Unlimited program was sold by Paratransit Services to the Trapeze Software, ULC company in 1996¹⁶, however, Paratransit Services retains the rights to use it for its own purposes (Note: The Trapeze Software, ULC company’s website includes no mention of Rides Unlimited). Taken together, these points raised concern about the overall long-term reliability and supportability of the program.

¹⁵ Source: <http://www.paratransit.net/story.html>
¹⁶ Source: <http://www.paratransit.net/pstech.html>



Neither TRAX nor ParaTRAX currently use what is referred to as an Intelligent Transit System (ITS) application. ITS programs are offered by many vendors and they provide many features to improve driver and rider satisfaction, efficiency, and safety. At the core of an ITS is a CAD program that uses a radio link (which can be of the two-way land mobile radio system currently used by TRAX or which can be a cellular phone system) to exchange information between drivers and dispatchers. The information can be voice-based or message-based, the latter using short, pre-established messages that drivers or dispatchers can send with just a few button pushes.

(NOTE: Some ITS programs do not allow a driver to begin a radio call at will, they must first send a message to dispatch asking for the opportunity to begin a call. Once the dispatcher approves the request, the ITS establishes the radio link and the call occurs between the dispatcher and only the driver that requested the conversation. This method of establishing calls is called "Request to Talk" or "RTT" and it can be of value in very large transit systems as the volume of calls between drivers and dispatchers can be large and potentially distracting to drivers. Drivers at TRAX currently do not use a method similar to RTT – they can call dispatcher without first receiving permission and all drivers can hear all conversations between any driver and dispatch. TRAX drivers have stated that they prefer the current method to RTT as it allows them to be aware of situations that may be occurring with other TRAX drivers and that the overall amount of radio traffic for TRAX is not high enough to cause distraction.)

An ITS can also use the radio link to exchange other data between buses and dispatchers including:

- Automatic Vehicle Location information in which the bus is equipped with a Global Positioning System receiver and it sends its latitude and longitude on an established cadence
- Bus Equipment information in which basic diagnostic data from the bus's engine, transmission, tire, wheelchair lift, or other parts is collected and sent to track, in real time, their performance and status
- Automatic Passenger Counters in which sensors count the number of riders entering and leaving the bus and provide that information to dispatchers
- Emergency Message in which a driver can notify dispatchers of an urgent situation and potentially active cameras or microphones on the bus to collect and share additional information

Again, an ITS program is not currently in use at TRAX. The purpose of describing it here is to provide an overview of capabilities that exist from the vendor community and that could be available for deployment at TRAX in the future¹⁷.

¹⁷ As of the writing of this report, CDX Wireless understands that the Tehama County Transportation Commission has begun planning for improvements to its bus management systems by entering into a non-binding agreement with California Integrated Mobility Program (Cal-ITP) to leverage the Cal-ITP's planning and resources and to begin updating TRAX's planning information system to the real time General Transit Feed Specifications and to upgrade its fare system to allow for the acceptance of EMV contactless payments. By this agreement, Cal-ITP will provide technical assistance to support the implementation of both initiatives.



	<p>TRAX’s use of the Rides Unlimited provides a useful feature of scheduling rides for the ParaTRAX program, however, the application does not include tools for reports or trend-analysis, it operates on an old and unsupported operating system, and the application may be unsupported and/or irreparable should it experience issues or failures. Other, more full-featured and more radio-integrated applications (known as Intelligent Transit System applications) exist to promote safety, efficiency, and raider satisfaction for transit operations like TRAX.</p>
	<p>Representatives from TRAX should confirm the availability of the installation media for Rides Unlimited so that it could be reinstalled on a new should its current computer fail.</p>
	<p>Deploying an Intelligent Transit System application for TRAX will be investigated for it’s capabilities, fit to TRAX’s operations, and cost effectiveness.</p>

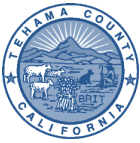
5. Compilation of Action Items & Next Steps







Through on-site visits to radio sites, face-to-face and telephone meetings/interviews, and surveys, CDX Wireless has identified a set of recommendations for immediate actions for TCSO, TCPW, and TRAX to improve its radio system as well as a collection to topics that will be carried forward in our next task for this Integrated Public Safety Communications Project; namely to investigate options for upgrades to or replacements of the two-way voice radio systems and the dispatch applications used by the stakeholder agencies. The following table lists those immediate recommendations and topics to be carried-forward:



Table – Compilation of Immediate Actions and Carry-Forward Requirements

Area of Assessment	Action Type	Recommendations / Topics
Radio Sites	Immediate	<ul style="list-style-type: none"> The tower at the TCSO Dispatch (TCSO Jail) facility should be structurally assessed and strengthened/remediated per the outcome of that assessment.
	Carry-Forward	<ul style="list-style-type: none"> Non-critical improvements are recommended for site and tower grounding, antenna transmission line routing and grounding, site backup power, and equipment rack bracing.
General Technology	Immediate	<ul style="list-style-type: none"> n/a
	Carry-Forward	<ul style="list-style-type: none"> Various technologies should be evaluated for future systems; including different radio frequency bands, analog and digital modulation methods, and conventional and trunked architectures; however, they should all be evaluated against their ability to meet user needs for performance (including coverage, features, interoperability) and cost.
Coverage	Immediate	<ul style="list-style-type: none"> Improving awareness of how and when to select the TCSO Rancho Tehama Reserve site/channel could improve perceptions of coverage as well as TCSO operations in the area.
	Carry-Forward	<ul style="list-style-type: none"> Improving coverage to TCSO, TCPW, and TRAX is an important goal for a new system. This includes ensuring a new system delivers radio coverage in areas not currently served as well as enable county-wide coverage (i.e., the ability for users at distant ends of the county to talk directly to each other without imposing cumbersome site/channel selection methods).
Interoperability	Immediate	<ul style="list-style-type: none"> n/a
	Carry-Forward	<ul style="list-style-type: none"> Continuing the currently high levels of interoperability among TCSO and its neighbor/partner law-enforcement agencies is important for a future system. Increasing the amount of interoperability between TCSO, TCPW, and TRAX should be evaluated.
Features	Immediate	<ul style="list-style-type: none"> n/a
	Carry-Forward	<ul style="list-style-type: none"> All user organizations felt new features, mainly GPS-location services, would help their operations. Other requested features for a new system included: <ul style="list-style-type: none"> For TCSO: Radio ID, Emergency, and Encryption For TCPW: the ability to talk to TCSO and to scan other channels For TRAX: 'canned' messages'

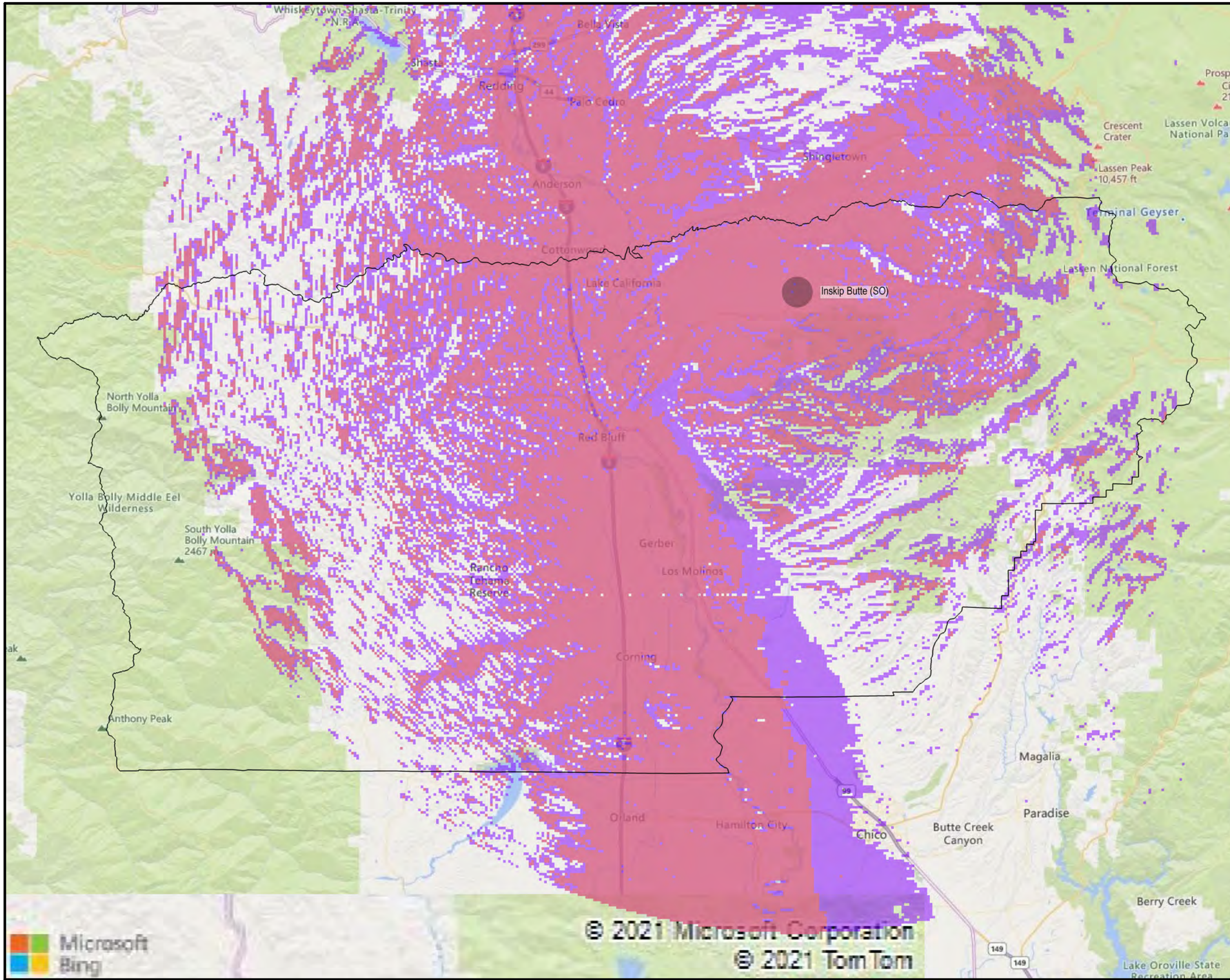


Area of Assessment	Action Type	Recommendations / Topics
Capacity	 Immediate	<ul style="list-style-type: none"> • n/a
	 Carry-Forward	<ul style="list-style-type: none"> • Both TCSO and TRAX noted that having a second channel (for tactical operations for TCSO and for a split between fixed-route and paratransit for TRAX) would be beneficial.
Equipment Usability	 Immediate	<ul style="list-style-type: none"> • Providing a refresher course on radio features and operations to TRAX users could eliminate some confusions some operators have about radio controls.
	 Carry-Forward	<ul style="list-style-type: none"> • Replacing the existing TCSO dispatch consoles with equipment that provides at least the same functionality but that is current/supported by its manufacturer should be a goal of a future system. • The specific enhancements noted by TCSO dispatchers, improved interface with EvidenceOnQ and DA access, will be investigated as possible enhancements to RIMS. • Deploying an Intelligent Transit System application for TRAX will be investigated for its capabilities, fit to TRAX's operations, and cost effectiveness.
Support	 Immediate	<ul style="list-style-type: none"> • Representatives from TRAX should confirm the availability of the installation media for Rides Unlimited so that it could be reinstalled on a new should its current computer fail.
	 Carry-Forward	<ul style="list-style-type: none"> • Ensuring that any future replacement or upgraded radio system has an appropriate and cost-effective set of support and maintenance services will be important to its long-term sustainability.



Appendix A – Coverage Maps

If not attached, please see separate file: "CDXW TRAX,TCSO,TCPW Inventory & Needs Assessment Report - AppxA, Maps (24Aug2021).PDF"



EDX SignalPro®: Tehama County

Tehama County Boundary
 Non-SIMO Field to Dispatch (Mobile On-street)
 >= 95.0 %
 < 95.0 %
 Display threshold level: -120.0 dBmW
 Non-SIMO Dispatch to Field (Mobile On-street)
 >= 95.0 %
 < 95.0 %
 Display threshold level: -120.0 dBmW

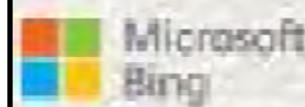
Notes
 This coverage map is for informational purposes only, no guarantee of coverage is expressed or implied

Tehama County
 SO - Inskip Butte
 95% Coverage Reliability Analog - DAQ 3.4

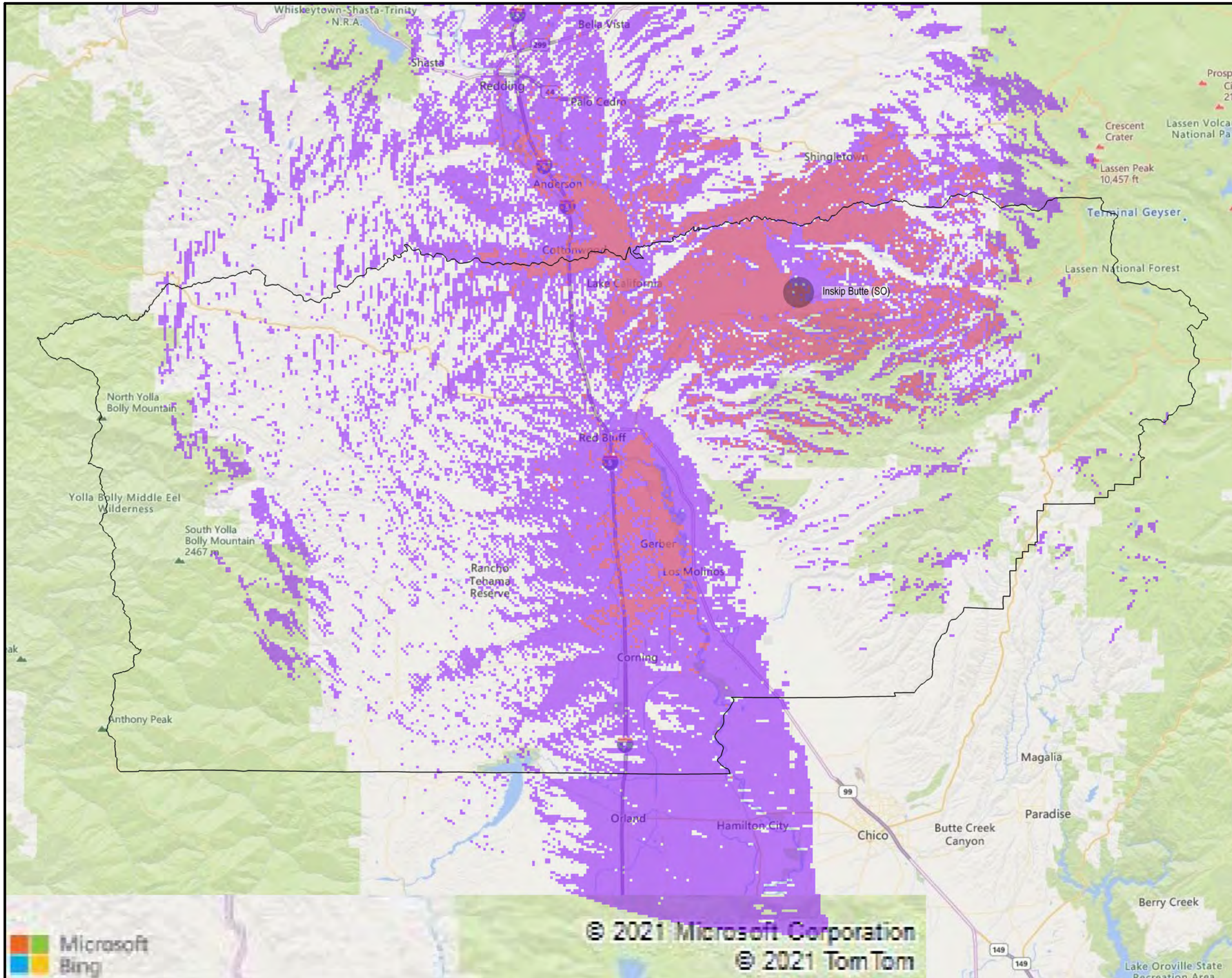
Integrated Public Safety Communications Project
Inventory & Needs Assessment Report
 Map # 01

- TCSO Inskip Butte Site
- Mobile On-Street
- Audio Quality: DAQ 3.4
- Reliability Level: 95% Coverage Area
- Areas of Talk-In Coverage (from field radios) shown in orange
- Areas of Talk-Out Coverage (from dispatch) shown in purple
- Areas of both Talk-In and Talk-Out Coverage shown in red

Map Created: 18 August, 2021



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EDX SignalPro®: Tehama County

— Tehama County Boundary

Non-SIMO Field to Dispatch (Portable On-street)

■ >= 95.0 %
■ < 95.0 %

Display threshold level: -120.0 dBmW

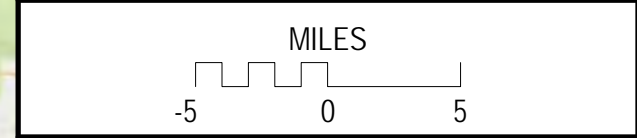
Non-SIMO Dispatch to Field (Portable On-street)

■ >= 95.0 %
■ < 95.0 %

Display threshold level: -120.0 dBmW

Notes

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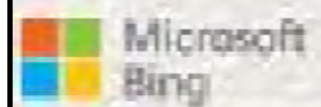
Tehama County
 SO - Inskip Butte
 95% Coverage Reliability Analog - DAQ 3.4



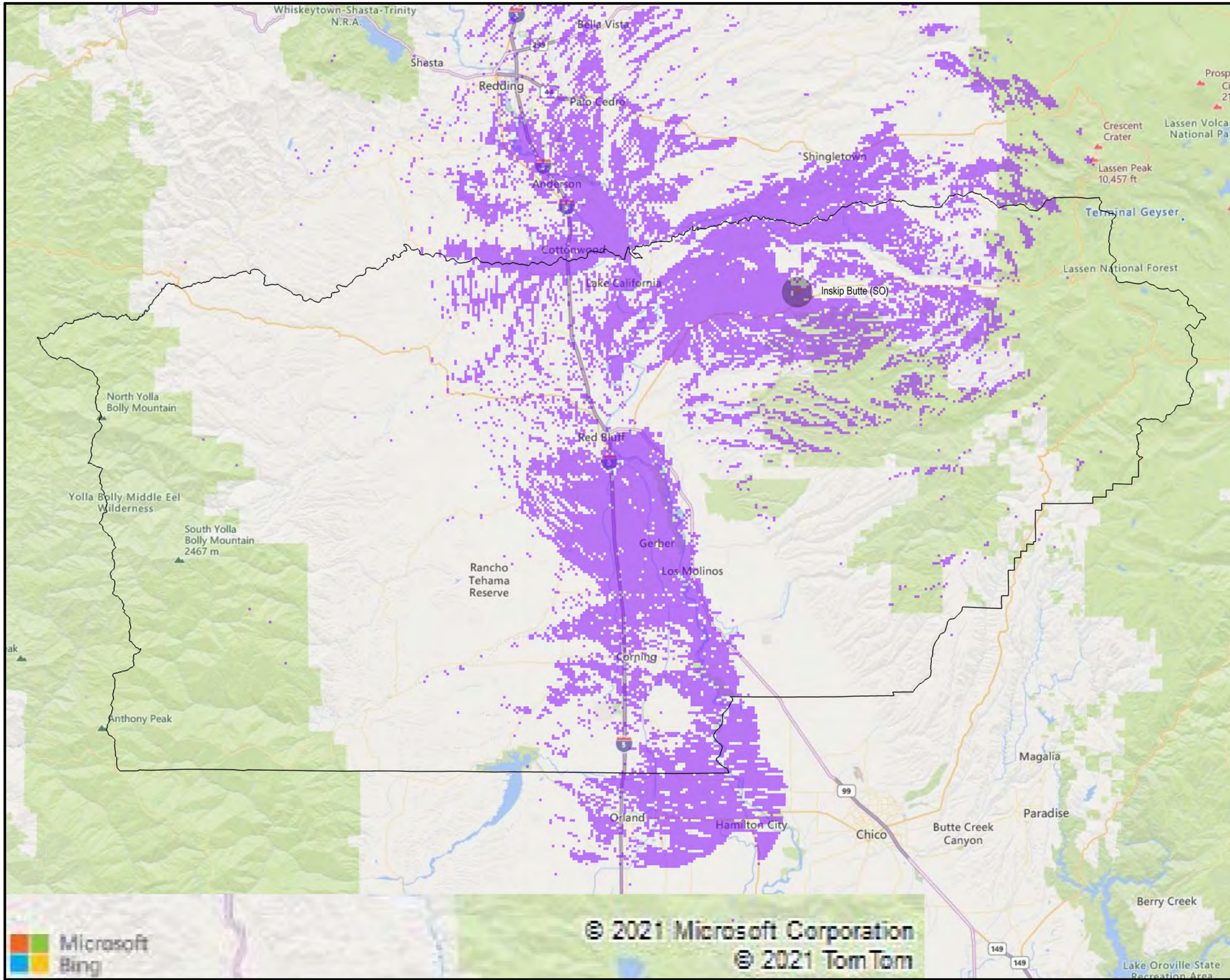
Integrated Public Safety Communications Project
Inventory & Needs Assessment Report
 Map # 02

- TCSO Inskip Butte Site
- Portable On-Street
- Audio Quality: DAQ 3.4
- Reliability Level: 95% Coverage Area
- Areas of Talk-In Coverage (from field radios) shown in orange
- Areas of Talk-Out Coverage (from dispatch) shown in purple
- Areas of both Talk-In and Talk-Out Coverage shown in red

Map Created: 18 August, 2021



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EDX SignalPro®: Tehama County

— Tehama County Boundary

Non-SIMO Field to Dispatch (Portable In-building)

■ >= 95.0 %
■ < 95.0 %

Display threshold level: -120.0 dBmW

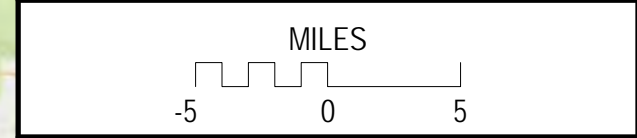
Non-SIMO Dispatch to Field (Portable In-building)

■ >= 95.0 %
■ < 95.0 %

Display threshold level: -120.0 dBmW

Notes

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Tehama County
 SO - Inskip Butte
 95% Coverage Reliability Analog - DAQ 3.4



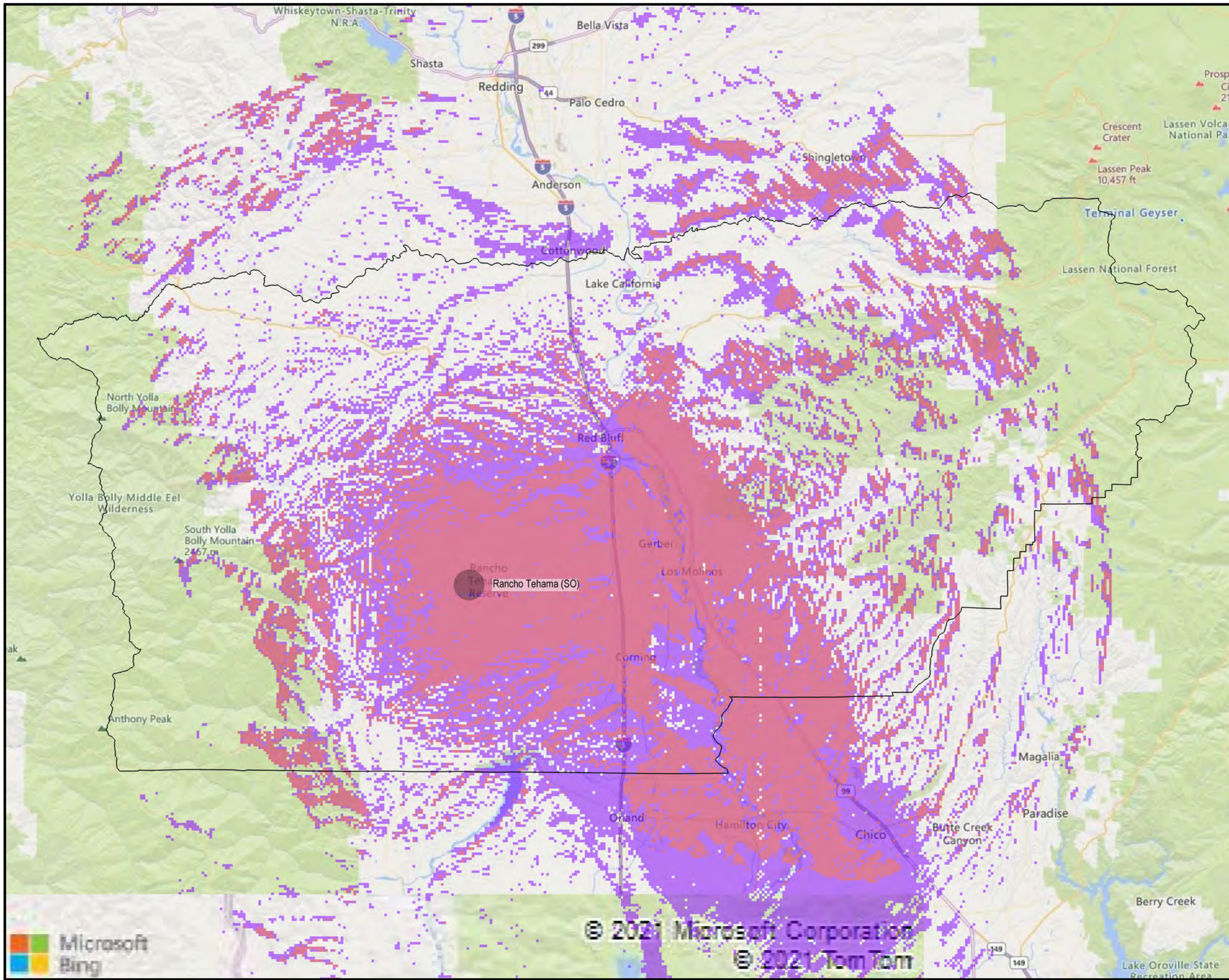
Integrated Public Safety Communications Project
Inventory & Needs Assessment Report
 Map # 03

- TCSO Inskip Butte Site
- Portable In Medium Building
- Audio Quality: DAQ 3.4
- Reliability Level: 95% Coverage Area
- Areas of Talk-In Coverage (from field radios) shown in orange
- Areas of Talk-Out Coverage (from dispatch) shown in purple
- Areas of both Talk-In and Talk-Out Coverage shown in red

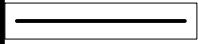




Map Created: 18 August, 2021



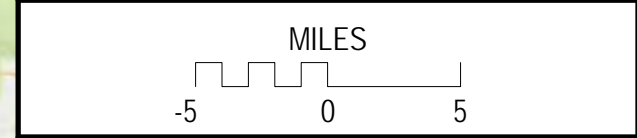
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EDX SignalPro®: Tehama County

 Tehama County Boundary
 Non-SIMO Field to Dispatch (Mobile On-street)
 >= 95.0 %
 < 95.0 %
 Display threshold level: -120.0 dBmW
 Non-SIMO Dispatch to Field (Mobile On-street)
 >= 95.0 %
 < 95.0 %
 Display threshold level: -120.0 dBmW

Notes
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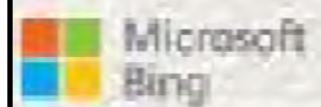
Tehama County
 SO - Rancho Tehama
 95% Coverage Reliability Analog - DAQ 3.4



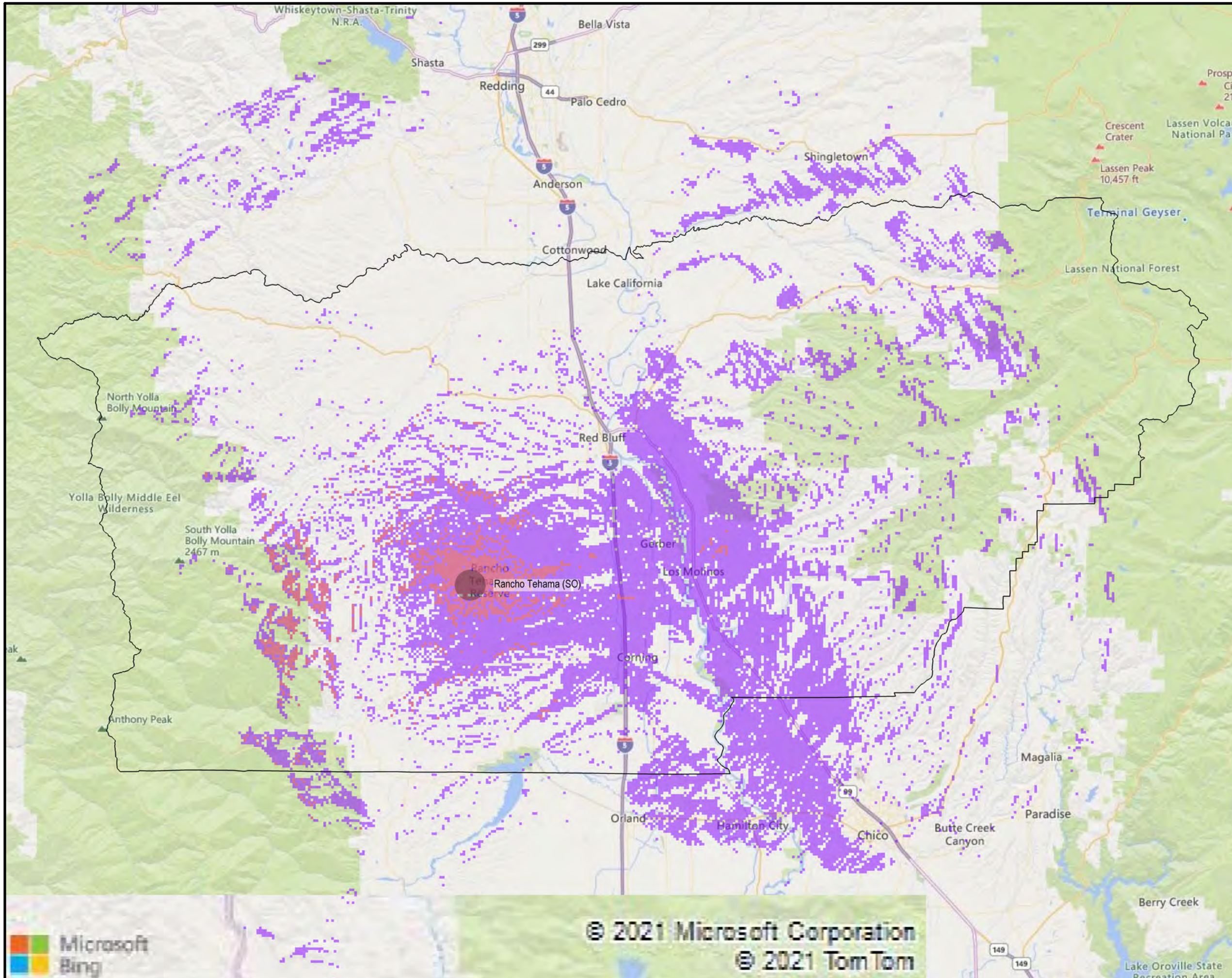
Integrated Public Safety Communications Project
Inventory & Needs Assessment Report
 Map # 04

- TCSO Rancho Tehama Site
- Mobile On-Street
- Audio Quality: DAQ 3.4
- Reliability Level: 95% Coverage Area
- Areas of Talk-In Coverage (from field radios) shown in orange
- Areas of Talk-Out Coverage (from dispatch) shown in purple
- Areas of both Talk-In and Talk-Out Coverage shown in red

Map Created: 18 August, 2021



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EDX SignalPro®: Tehama County

Tehama County Boundary
 Non-SIMO Field to Dispatch (Portable On-street)

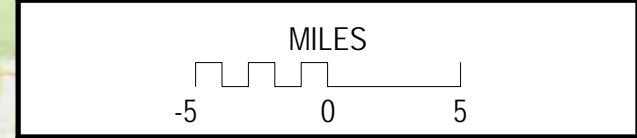
>= 95.0 %
 < 95.0 %
 Display threshold level: -120.0 dBmW

Non-SIMO Dispatch to Field (Portable On-street)

>= 95.0 %
 < 95.0 %
 Display threshold level: -120.0 dBmW

Notes

This coverage map is for informational purposes only, no guarantee of coverage is expressed or implied



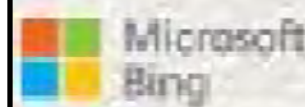
Tehama County
 SO - Rancho Tehama
 95% Coverage Reliability Analog - DAQ 3.4



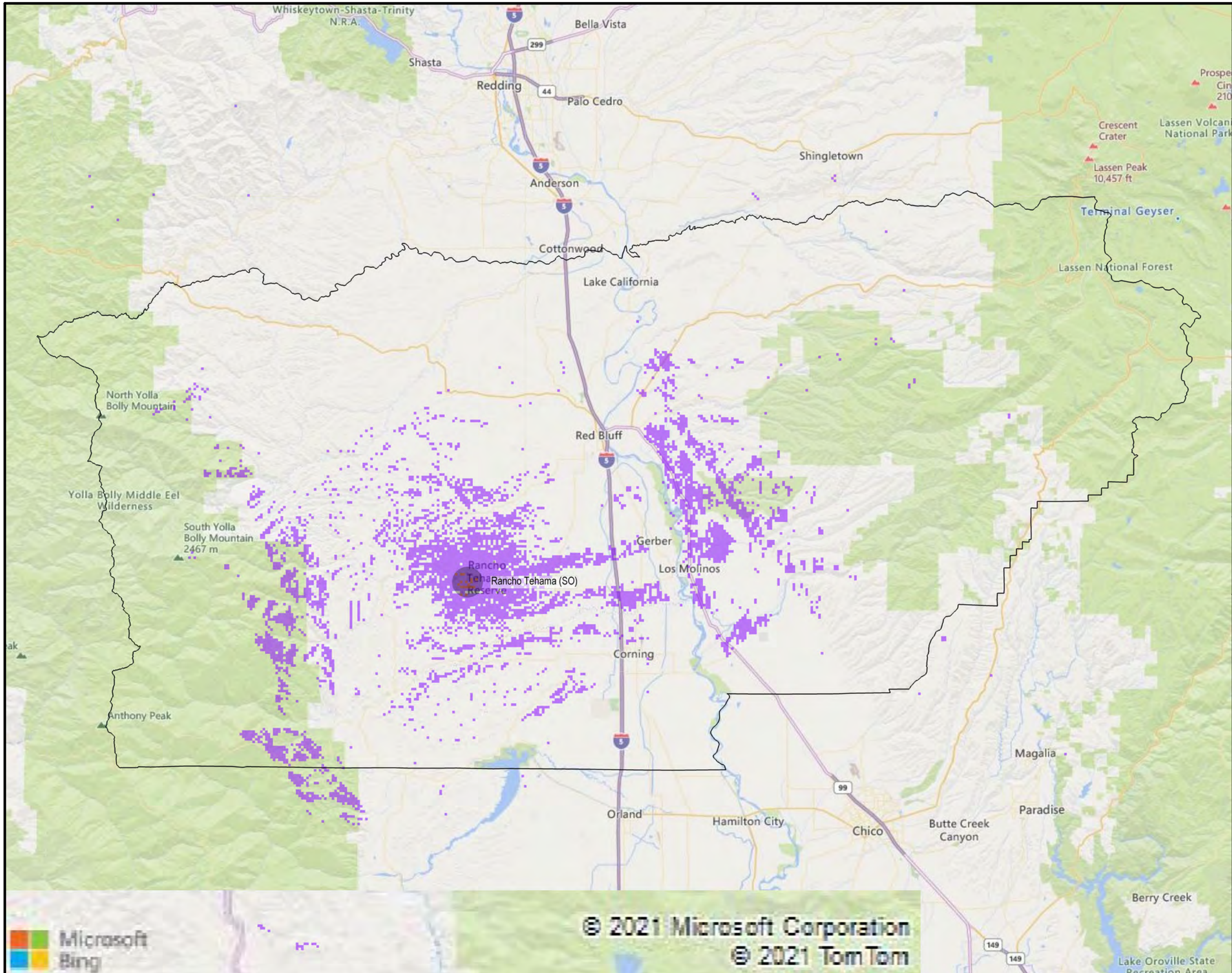
Integrated Public Safety Communications Project
Inventory & Needs Assessment Report
 Map # 05

- TCSO Rancho Tehama Site
- Portable On-Street
- Audio Quality: DAQ 3.4
- Reliability Level: 95% Coverage Area
- Areas of Talk-In Coverage (from field radios) shown in orange
- Areas of Talk-Out Coverage (from dispatch) shown in purple
- Areas of both Talk-In and Talk-Out Coverage shown in red

Map Created: 18 August, 2021



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EDX SignalPro®: Tehama County

— Tehama County Boundary

Non-SIMO Field to Dispatch (Portable In-building)

■ >= 95.0 %
■ < 95.0 %

Display threshold level: -120.0 dBmW

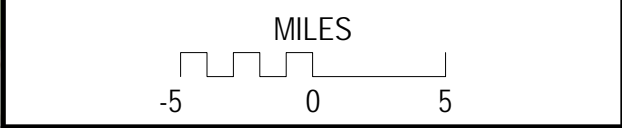
Non-SIMO Dispatch to Field (Portable In-building)

■ >= 95.0 %
■ < 95.0 %

Display threshold level: -120.0 dBmW

Notes

This coverage map is for informational purposes only, no guarantee of coverage is expressed or implied



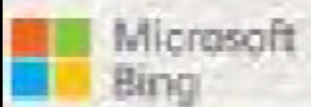
Tehama County
 SO - Rancho Tehama
 95% Coverage Reliability Analog - DAQ 3.4



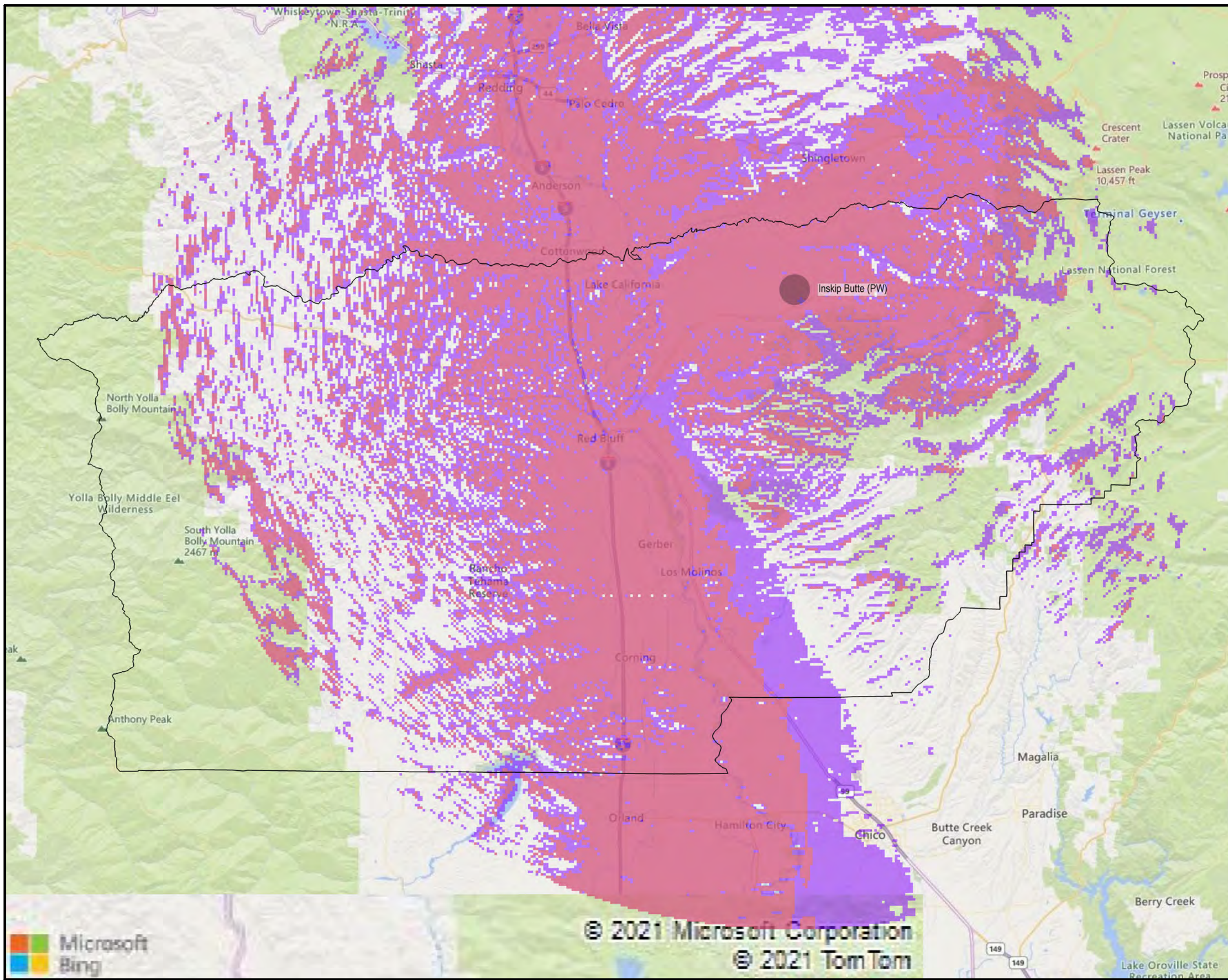
Integrated Public Safety Communications Project
Inventory & Needs Assessment Report
 Map # 06

- TCSO Rancho Tehama Site
- Portable In-Building
- Audio Quality: DAQ 3.4
- Reliability Level: 95% Coverage Area
- Areas of Talk-In Coverage (from field radios) shown in orange
- Areas of Talk-Out Coverage (from dispatch) shown in purple
- Areas of both Talk-In and Talk-Out Coverage shown in red

Map Created: 18 August, 2021



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EDX SignalPro®: Tehama County

— Tehama County Boundary

Non-SIMO Field to Dispatch (Mobile On-street)

■ >= 95.0 %
■ < 95.0 %

Display threshold level: -120.0 dBmW

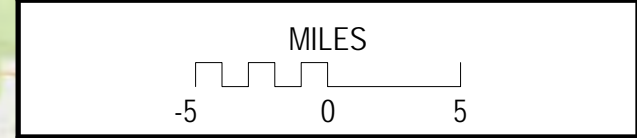
Non-SIMO Dispatch to Field (Mobile On-street)

■ >= 95.0 %
■ < 95.0 %

Display threshold level: -120.0 dBmW

Notes

This coverage map is for informational purposes only, no guarantee of coverage is expressed or implied



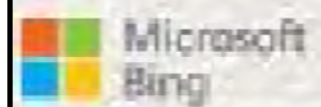
Tehama County
 PW - Inskip Butte
 95% Coverage Reliability Analog - DAQ 3.4



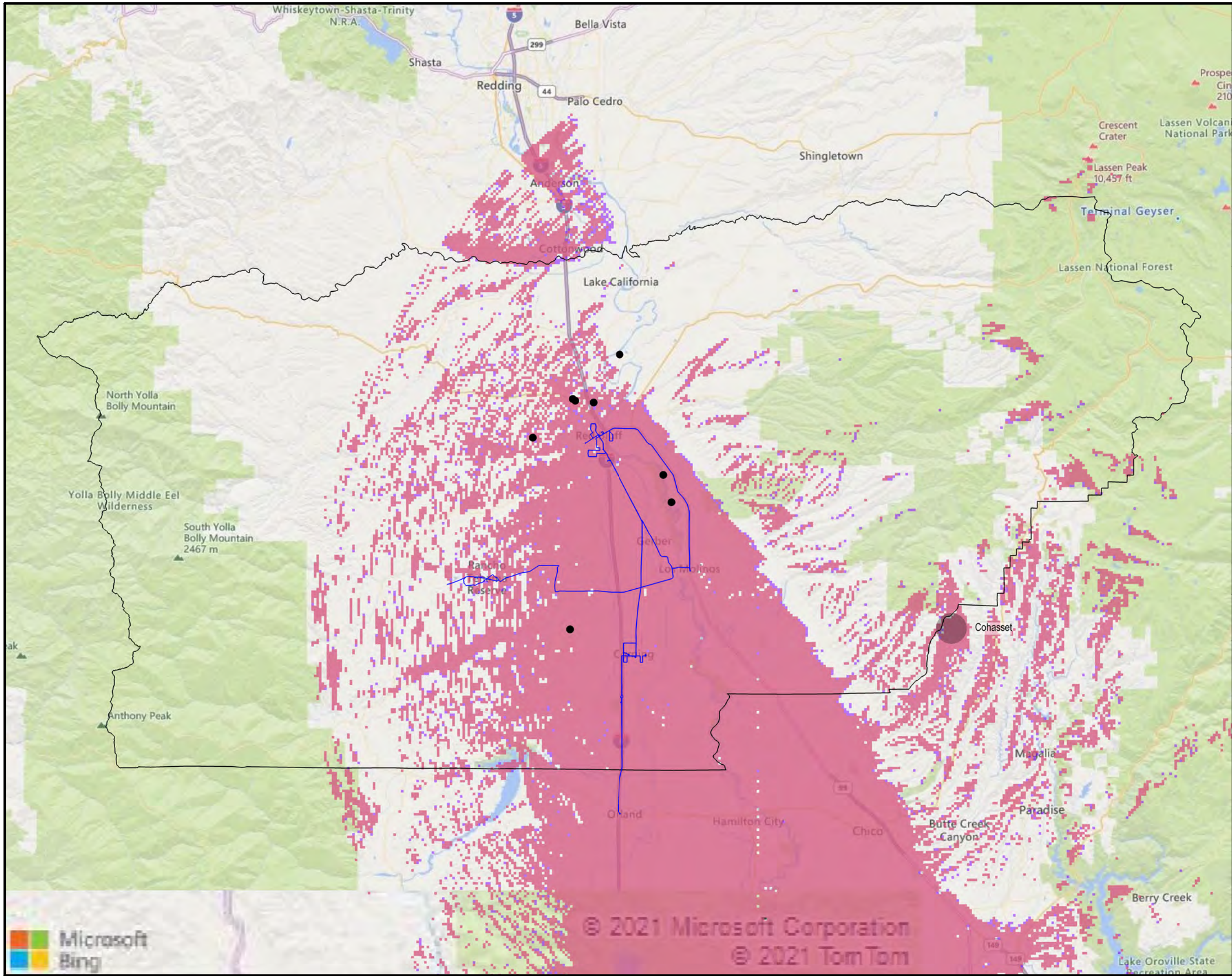
Integrated Public Safety Communications Project
Inventory & Needs Assessment Report
 Map # 07

- TCPW Inskip Butte Site
- Mobile On-Street
- Audio Quality: DAQ 3.4
- Reliability Level: 95% Coverage Area
- Areas of Talk-In Coverage (from field radios) shown in orange
- Areas of Talk-Out Coverage (from dispatch) shown in purple
- Areas of both Talk-In and Talk-Out Coverage shown in red

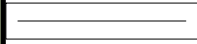

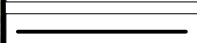
Map Created: 18 August, 2021





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EDX SignalPro®: Tehama County



-  ParaTRAX Data
-  Combined TRAX lines
-  Tehama County Boundary

Non-SIMO Field to Dispatch (Mobile On-street)

-  >= 95.0 %
-  < 95.0 %

Display threshold level: -120.0 dBmW

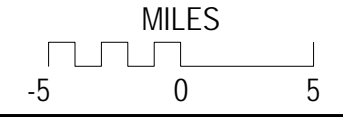
Non-SIMO Dispatch to Field (Mobile On-street)

-  >= 95.0 %
-  < 95.0 %

Display threshold level: -120.0 dBmW

Notes

This coverage map is for informational purposes only, no guarantee of coverage is expressed or implied



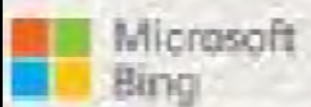
Tehama County



Integrated Public Safety Communications Project
Inventory & Needs Assessment Report
 Map # 08

- TRAX Cohasset Ridge System
- Mobile On-Street
- Audio Quality: DAQ 3.4
- Reliability Level: 95% Coverage Area
- Areas of Talk-In Coverage (from field radios) shown in orange
- Areas of Talk-Out Coverage (from dispatch) shown in purple
- Areas of both Talk-In and Talk-Out Coverage shown in red

Map Created: 18 August, 2021



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Appendix B – Site Walk Forms

Sitewalk Report Datasheet



General Information			
Site Name:	Inskip Butte	Survey Date:	23-03-21
Site Address:	502 Oak St	City:	Red Bluff
Latitude:	40 20 29.33 N	Datum:	WGS84
Longitude:	121 56 37.34 W	Source:	GPS
Site Type:	<input type="checkbox"/> Microwave <input type="checkbox"/> Dispatch Center <input checked="" type="checkbox"/> RF Site <input type="checkbox"/> Other	If OTHER, please describe:	
Comments:			
Primary RF site for Tehama County SO and PW.			

Sitewalk Report Datasheet



General Site Conditions			
Is the site located in a:	<input checked="" type="checkbox"/> Earthquake Zone <input type="checkbox"/> Flood Zone <input checked="" type="checkbox"/> Potential Forest Fire Zone <input type="checkbox"/> High Wind Area (including Tornado and Hurricane) <input type="checkbox"/> Tsunami Inundation Zone		
Please describe and hazard mitigation strategies employed, if any:			
Site Location Type:	<input type="checkbox"/> Street Level <input checked="" type="checkbox"/> Mountaintop <input type="checkbox"/> Water Tank		If OTHER, please describe:
	<input type="checkbox"/> Building <input type="checkbox"/> Other		
Please describe general surroundings:			
Located atop the butte, the site is located in a lightly forested area with trees within 20-30 of the shelter.			
Property Zoning:		Property Ownership:	
Contact Name:		Phone:	
Organization:		Email:	
Shelter Ownership:		Shelter Owner Organization:	
Comments:			

Sitewalk Report Datasheet



Site Access and Security			
Vehicular Access:	<input type="radio"/> None <input type="radio"/> 2WD <input checked="" type="radio"/> 4WD Only	Are there any vehicle size/weight restrictions? Please describe:	None
Can access be restricted due to weather? (flood, treacherous conditions, etc.)	<input checked="" type="radio"/> Yes <input type="radio"/> No	If YES, Please describe:	
Is helicopter access possible?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Is site road access gated and locked	<input type="radio"/> Yes <input checked="" type="radio"/> No	If YES, Please describe keys and/or combinations require for access:	
Type of site perimeter fence or wall	None	External Lighting	<input type="radio"/> Yes <input checked="" type="radio"/> No
RF Safety Signage Present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Security Cameras:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Comments:			
Site access road is typical for a mountaintop site with a dirt/gravel road covering the last 3-5 miles. Site could become difficult to access during winter months or after significant rainfall.			

Sitewalk Report Datasheet



Tower Information				
Type:	Guyed	Height:	90	<input type="radio"/> Meters <input checked="" type="radio"/> Feet
Manufacturer:		Year Manufactured:		
Model Number:		ASR:		
Is the tower lighted?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is the tower painted?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Is the tower grounded at the base?	<input checked="" type="radio"/> Yes <input type="radio"/> No	Is each tower leg grounded?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Cable raceway or icebridge installed?	<input type="radio"/> Yes <input checked="" type="radio"/> No	If so, is it electrically isolated from tower?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Antenna Loading: ¹	Moderate	Has a loading study been completed?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Is supplementary tower documentation available?	<input type="radio"/> Yes <input checked="" type="radio"/> No	If so, contact information for documentation:		
Comments:				
Tower is a guyed tower. Appears to be a Rohn-25 type tower. Tower appears to have a ground rod/ring installed near the base, however connections are made with screw-on mechanical connections, not irreversible crimp or cad-welded connections. Ground efficacy not tested.				

¹ Antenna loading is strictly based on visual observation and should not be used as an indicator of actual tower capacity or stress on the structure. A loading study is necessary to ensure that any additional loading presented by additional antennas does not negatively impact tower structural integrity. The loading study should be conducted by a licensed professional engineer qualified to perform tower and structural assessments.

Sitewalk Report Datasheet



Sitewalk Report Datasheet



Antenna and Transmission Line Information			
Transmission Line Condition	Good	Connectors weatherproofed:	<input checked="" type="radio"/> Yes <input type="radio"/> No
Lines grounded at ant, twr, and bldg?	<input checked="" type="radio"/> Yes <input type="radio"/> No	Line secured to tower with clamps/cable raceway?	<input type="radio"/> Yes <input checked="" type="radio"/> No
Mounting hardware in good condition?	<input checked="" type="radio"/> Yes <input type="radio"/> No	Available mounting spaces?	<input checked="" type="radio"/> Yes <input type="radio"/> No
Is supplementary antenna documentation available?	<input type="radio"/> Yes <input checked="" type="radio"/> No	If so, contact information for documentation:	
Comments:			

Lines are grounded near the tower base but the ground buss bar used has a mechanical screw connection to ground that is corroded. Corrosion on this connection makes the efficacy of the grounding suspect.

Sitewalk Report Datasheet



Shelter Information (Exterior)			
Type:	<input type="radio"/> Standalone Shelter <input checked="" type="radio"/> Building <input type="radio"/> Outdoor Cabinet		
Type of Construction:	<input type="radio"/> Wood <input checked="" type="radio"/> Steel <input type="radio"/> Concrete <input type="radio"/> Brick/Concrete Block <input type="radio"/> Fiberglass/Aggregate		
General Shelter Condition:	Fair	Shelter Description (Make/Model, if available):	
Is exterior ground system present:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Are connections good (exothermic weld, no rust):	<input type="radio"/> Yes <input checked="" type="radio"/> No
Is a standard cable entry port present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is port grounded:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Are ports properly sealed and have correct # of cables per boot:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Any evidence of vandalism:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Comments:			

Sitewalk Report Datasheet



Shelter Information (Interior)				
Is there an active fire alarm system present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Active fire suppression system:	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Handheld fire extinguisher present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is there a first aid kit present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Are there batteries on site:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is there a battery safety kit on site (gloves, eye wash, etc.):	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Is there emergency lighting and signage on site:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Site telephone number:		
Are the following alarmed:	<input type="checkbox"/> Site Door <input type="checkbox"/> Fire Alarm	<input type="checkbox"/> HVAC/Overtemp <input type="checkbox"/> Equipment Alarms	Where are alarms monitored:	N/A
Are cable trays used on site:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Cable Tray Height:		
Are cables dressed properly:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Are RF, Power and Signal cables segregated:	<input checked="" type="radio"/> Yes <input type="radio"/> No	
Are racks and cabinets mounted and secured to the floor:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Is seismic bracing required, describe bracing:		
Comments:				

No seismic bracing

Sitewalk Report Datasheet



Shelter Information (Electrical and Grounding)			
Is there an interior ground system present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Does the ground system use a Master Ground Bus Bar:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Is the interior ground tied to the exterior ground:	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Are the following grounded:	<input type="checkbox"/> Racks/Cabinets <input type="checkbox"/> Rack Mounted Equipment <input type="checkbox"/> Cable Entry <input type="checkbox"/> Cable Trays <input type="checkbox"/> Metallic Objects (Doors, Frames, etc.)		
Are the following Surge Protected:	<input type="checkbox"/> AC Power <input type="checkbox"/> Antenna RF Cables <input type="checkbox"/> Incoming Telephone Lines/T1's		
Is commercial AC power available:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Service Voltage and Amp rating:	
		Unused ckt breaker slots:	
Is there a DC power system available:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Service Voltage and Amp rating:	
		Unused ckt breaker slots:	
Is there a site UPS:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Make/Model/Size Estimated: Runtime:	
Is there a site generator:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Make/Model/Size Estimated: Runtime:	5 KW. Technicians report a 2 week runtime.
		Fuel Type: Tank Size:	
Comments:			
Technicians report that the generator is 1967 vintage. If so, should probably look to replace generator due to age.			

Sitewalk Report Datasheet



Summary Comments

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Sitewalk Report Datasheet



General Information			
Site Name:	Tehama County SO Dispatch	Survey Date:	23-03-21
Site Address:	502 Oak St	City:	Red Bluff
Latitude:	40 10 32.8 N	Datum:	WGS84
Longitude:	122 14 13 W	Source:	GPS
Site Type:	<input type="checkbox"/> Microwave <input checked="" type="checkbox"/> Dispatch Center <input checked="" type="checkbox"/> RF Site <input type="checkbox"/> Other	If OTHER, please describe:	
Comments:			
Dispatch center for Tehama County SO. Houses dispatch consoles, CAD, and RF control stations.			

Sitewalk Report Datasheet



General Site Conditions			
Is the site located in a:	<input checked="" type="checkbox"/> Earthquake Zone <input type="checkbox"/> Flood Zone <input type="checkbox"/> Potential Forest Fire Zone <input type="checkbox"/> High Wind Area (including Tornado and Hurricane) <input type="checkbox"/> Tsunami Inundation Zone		
Please describe and hazard mitigation strategies employed, if any:			
Site Location Type:	<input type="checkbox"/> Street Level <input type="checkbox"/> Mountaintop <input type="checkbox"/> Water Tank		If OTHER, please describe:
	<input checked="" type="checkbox"/> Building <input type="checkbox"/> Other		
Please describe general surroundings:			
Located in downtown area with surrounding area populated with typical commercial buildings with 1 to 2 story heights.			
Property Zoning:		Property Ownership:	County
Contact Name:		Phone:	
Organization:		Email:	
Shelter Ownership:	County	Shelter Owner Organization:	
Comments:			

Sitewalk Report Datasheet



Site Access and Security			
Vehicular Access:	<input type="radio"/> None <input checked="" type="radio"/> 2WD <input type="radio"/> 4WD Only	Are there any vehicle size/weight restrictions? Please describe:	None
Can access be restricted due to weather? (flood, treacherous conditions, etc.)	<input type="radio"/> Yes <input checked="" type="radio"/> No	If YES, Please describe:	
Is helicopter access possible?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Is site road access gated and locked	<input type="radio"/> Yes <input checked="" type="radio"/> No	If YES, Please describe keys and/or combinations require for access:	
Type of site perimeter fence or wall	None	External Lighting	<input type="radio"/> Yes <input checked="" type="radio"/> No
RF Safety Signage Present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Security Cameras:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Comments:			

Sitewalk Report Datasheet



Tower Information				
Type:	Other (Note in comment)	Height:	20	<input type="radio"/> Meters <input checked="" type="radio"/> Feet
Manufacturer:		Year Manufactured:		
Model Number:		ASR:		
Is the tower lighted?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is the tower painted?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Is the tower grounded at the base?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is each tower leg grounded?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Cable raceway or icebridge installed?	<input type="radio"/> Yes <input checked="" type="radio"/> No	If so, is it electrically isolated from tower?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Antenna Loading: ¹	Heavy	Has a loading study been completed?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Is supplementary tower documentation available?	<input type="radio"/> Yes <input checked="" type="radio"/> No	If so, contact information for documentation:		
Comments:				
Tower is located on roof of dispatch building. Appears to be a non-guyed Rohn type tower. Noted during the sitewalk that the tower itself was visibly swaying in the presence of a light wind. Highly recommend that a tower structural analysis be completed with subsequent structural improvements implemented to increase tower stability.				

¹ Antenna loading is strictly based on visual observation and should not be used as an indicator of actual tower capacity or stress on the structure. A loading study is necessary to ensure that any additional loading presented by additional antennas does not negatively impact tower structural integrity. The loading study should be conducted by a licensed professional engineer qualified to perform tower and structural assessments.

Sitewalk Report Datasheet



Sitewalk Report Datasheet



Antenna and Transmission Line Information			
Transmission Line Condition	Good	Connectors weatherproofed:	<input checked="" type="radio"/> Yes <input type="radio"/> No
Lines grounded at ant, twr, and bldg?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Line secured to tower with clamps/cable raceway?	<input type="radio"/> Yes <input checked="" type="radio"/> No
Mounting hardware in good condition?	<input checked="" type="radio"/> Yes <input type="radio"/> No	Available mounting spaces?	<input checked="" type="radio"/> Yes <input type="radio"/> No
Is supplementary antenna documentation available?	<input type="radio"/> Yes <input checked="" type="radio"/> No	If so, contact information for documentation:	
Comments:			

Sitewalk Report Datasheet



Shelter Information (Exterior)			
Type:	<input type="radio"/> Standalone Shelter <input checked="" type="radio"/> Building <input type="radio"/> Outdoor Cabinet		
Type of Construction:	<input type="radio"/> Wood <input type="radio"/> Steel <input type="radio"/> Concrete <input checked="" type="radio"/> Brick/Concrete Block <input type="radio"/> Fiberglass/Aggregate		
General Shelter Condition:	Good	Shelter Description (Make/Model, if available):	
Is exterior ground system present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Are connections good (exothermic weld, no rust):	<input type="radio"/> Yes <input checked="" type="radio"/> No
Is a standard cable entry port present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is port grounded:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Are ports properly sealed and have correct # of cables per boot:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Any evidence of vandalism:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Comments:			

Antenna lines enter the building through holes drilled into building exterior.

Sitewalk Report Datasheet



Shelter Information (Interior)			
Is there an active fire alarm system present:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Active fire suppression system:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Handheld fire extinguisher present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is there a first aid kit present:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Are there batteries on site:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is there a battery safety kit on site (gloves, eye wash, etc.):	<input type="radio"/> Yes <input checked="" type="radio"/> No
Is there emergency lighting and signage on site:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Site telephone number:	
Are the following alarmed:	<input type="checkbox"/> Site Door <input type="checkbox"/> Fire Alarm	<input type="checkbox"/> HVAC/Overtemp <input type="checkbox"/> Equipment Alarms	Where are alarms monitored: N/A
Are cable trays used on site:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Cable Tray Height:	
Are cables dressed properly:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Are RF, Power and Signal cables segregated:	<input checked="" type="radio"/> Yes <input type="radio"/> No
Are racks and cabinets mounted and secured to the floor:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Is seismic bracing required, describe bracing:	Uni-strut anchor. See below.
Comments:			

Rack housing control stations is secured to the floor with a single uni-strut channel anchored to the wall and extending to the top of the rack. This rigid bracing would not give during a large seismic event and would likely result in anchors being ripped free with the rack toppling. Bracing also does not provide lateral stability.

Sitewalk Report Datasheet



Shelter Information (Electrical and Grounding)			
Is there an interior ground system present:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Does the ground system use a Master Ground Bus Bar:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Is the interior ground tied to the exterior ground:	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Are the following grounded:	<input type="checkbox"/> Racks/Cabinets <input type="checkbox"/> Rack Mounted Equipment <input type="checkbox"/> Cable Entry <input type="checkbox"/> Cable Trays <input type="checkbox"/> Metallic Objects (Doors, Frames, etc.)		
Are the following Surge Protected:	<input type="checkbox"/> AC Power <input type="checkbox"/> Antenna RF Cables <input type="checkbox"/> Incoming Telephone Lines/T1's		
Is commercial AC power available:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Service Voltage and Amp rating:	
		Unused ckt breaker slots:	
Is there a DC power system available:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Service Voltage and Amp rating:	
		Unused ckt breaker slots:	
Is there a site UPS:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Make/Model/Size Estimated: Runtime:	
Is there a site generator:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Make/Model/Size Estimated: Runtime:	
		Fuel Type: Tank Size:	
Comments:			
There is an interior ground buss but grounding of racks and equipment is haphazard and generally not complete. It was noted that the control station rack has a grounding lug attached but no grounding conductor inserted Lightning arrestors are installed on incoming antenna lines, but are not bonded to any type of ground conductor.			

Sitewalk Report Datasheet



Summary Comments

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Sitewalk Report Datasheet



General Information			
Site Name:	TRAX Dispatch	Survey Date:	28-01-21
Site Address:	1509 Schwab St	City:	Red Bluff
Latitude:	40 9 18.3N	Datum:	WGS84
Longitude:	122 14 54.3W	Source:	GPS
Site Type:	<input type="checkbox"/> Microwave <input checked="" type="checkbox"/> Dispatch Center <input checked="" type="checkbox"/> RF Site <input type="checkbox"/> Other	If OTHER, please describe:	
Comments:			
Primary dispatch for TRAX.			

Sitewalk Report Datasheet



General Site Conditions			
Is the site located in a:	<input checked="" type="checkbox"/> Earthquake Zone <input type="checkbox"/> Flood Zone <input type="checkbox"/> Potential Forest Fire Zone <input type="checkbox"/> High Wind Area (including Tornado and Hurricane) <input type="checkbox"/> Tsunami Inundation Zone		
Please describe and hazard mitigation strategies employed, if any:			
Site Location Type:	<input checked="" type="checkbox"/> Street Level <input type="checkbox"/> Mountaintop <input type="checkbox"/> Water Tank	If OTHER, please describe:	
	<input type="checkbox"/> Building <input type="checkbox"/> Other		
Please describe general surroundings:			
Located in a industrial area with surrounding area populated with warehouse type buildings. The Red Bluff Municipal Airport is within a 1/2 mile of site.			
Property Zoning:	Industrial	Property Ownership:	County
Contact Name:		Phone:	
Organization:		Email:	
Shelter Ownership:	County	Shelter Owner Organization:	
Comments:			

Sitewalk Report Datasheet



Site Access and Security			
Vehicular Access:	<input type="radio"/> None <input checked="" type="radio"/> 2WD <input type="radio"/> 4WD Only	Are there any vehicle size/weight restrictions? Please describe:	None
Can access be restricted due to weather? (flood, treacherous conditions, etc.)	<input type="radio"/> Yes <input checked="" type="radio"/> No	If YES, Please describe:	
Is helicopter access possible?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Is site road access gated and locked	<input type="radio"/> Yes <input checked="" type="radio"/> No	If YES, Please describe keys and/or combinations require for access:	
Type of site perimeter fence or wall	None	External Lighting	<input type="radio"/> Yes <input checked="" type="radio"/> No
RF Safety Signage Present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Security Cameras:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Comments:			

Sitewalk Report Datasheet



Tower Information				
Type:	Building Structure	Height:	20	<input type="radio"/> Meters <input checked="" type="radio"/> Feet
Manufacturer:		Year Manufactured:		
Model Number:		ASR:		
Is the tower lighted?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is the tower painted?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Is the tower grounded at the base?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is each tower leg grounded?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Cable raceway or icebridge installed?	<input type="radio"/> Yes <input checked="" type="radio"/> No	If so, is it electrically isolated from tower?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Antenna Loading: ¹	Light	Has a loading study been completed?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Is supplementary tower documentation available?	<input type="radio"/> Yes <input checked="" type="radio"/> No	If so, contact information for documentation:		
Comments:				
Site used for single control station antenna for dispatch. Antenna is mounted on building structure itself. No visible grounding or lightning protection present.				

¹ Antenna loading is strictly based on visual observation and should not be used as an indicator of actual tower capacity or stress on the structure. A loading study is necessary to ensure that any additional loading presented by additional antennas does not negatively impact tower structural integrity. The loading study should be conducted by a licensed professional engineer qualified to perform tower and structural assessments.

Sitewalk Report Datasheet



Sitewalk Report Datasheet



Antenna and Transmission Line Information			
Transmission Line Condition	Good	Connectors weatherproofed:	<input checked="" type="radio"/> Yes <input type="radio"/> No
Lines grounded at ant, twr, and bldg?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Line secured to tower with clamps/cable raceway?	<input type="radio"/> Yes <input checked="" type="radio"/> No
Mounting hardware in good condition?	<input checked="" type="radio"/> Yes <input type="radio"/> No	Available mounting spaces?	<input checked="" type="radio"/> Yes <input type="radio"/> No
Is supplementary antenna documentation available?	<input type="radio"/> Yes <input checked="" type="radio"/> No	If so, contact information for documentation:	
Comments:			

Sitewalk Report Datasheet



Shelter Information (Exterior)			
Type:	<input type="radio"/> Standalone Shelter <input checked="" type="radio"/> Building <input type="radio"/> Outdoor Cabinet		
Type of Construction:	<input type="radio"/> Wood <input checked="" type="radio"/> Steel <input type="radio"/> Concrete <input type="radio"/> Brick/Concrete Block <input type="radio"/> Fiberglass/Aggregate		
General Shelter Condition:	Good	Shelter Description (Make/Model, if available):	
Is exterior ground system present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Are connections good (exothermic weld, no rust):	<input type="radio"/> Yes <input checked="" type="radio"/> No
Is a standard cable entry port present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is port grounded:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Are ports properly sealed and have correct # of cables per boot:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Any evidence of vandalism:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Comments:			

Sitewalk Report Datasheet



Shelter Information (Interior)				
Is there an active fire alarm system present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Active fire suppression system:	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Handheld fire extinguisher present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is there a first aid kit present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Are there batteries on site:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is there a battery safety kit on site (gloves, eye wash, etc.):	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Is there emergency lighting and signage on site:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Site telephone number:		
Are the following alarmed:	<input type="checkbox"/> Site Door <input type="checkbox"/> Fire Alarm	<input type="checkbox"/> HVAC/Overtemp <input type="checkbox"/> Equipment Alarms	Where are alarms monitored:	N/A
Are cable trays used on site:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Cable Tray Height:		
Are cables dressed properly:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Are RF, Power and Signal cables segregated:	<input checked="" type="radio"/> Yes <input type="radio"/> No	
Are racks and cabinets mounted and secured to the floor:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Is seismic bracing required, describe bracing:		
Comments:				

Sitewalk Report Datasheet



Shelter Information (Electrical and Grounding)			
Is there an interior ground system present:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Does the ground system use a Master Ground Bus Bar:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Is the interior ground tied to the exterior ground:	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Are the following grounded:	<input type="checkbox"/> Racks/Cabinets <input type="checkbox"/> Rack Mounted Equipment <input type="checkbox"/> Cable Entry <input type="checkbox"/> Cable Trays <input type="checkbox"/> Metallic Objects (Doors, Frames, etc.)		
Are the following Surge Protected:	<input type="checkbox"/> AC Power <input type="checkbox"/> Antenna RF Cables <input type="checkbox"/> Incoming Telephone Lines/T1's		
Is commercial AC power available:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Service Voltage and Amp rating:	
		Unused ckt breaker slots:	
Is there a DC power system available:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Service Voltage and Amp rating:	
		Unused ckt breaker slots:	
Is there a site UPS:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Make/Model/Size Estimated: Runtime:	
Is there a site generator:	<input type="radio"/> Yes <input checked="" type="radio"/> No	Make/Model/Size Estimated: Runtime:	
		Fuel Type: Tank Size:	
Comments:			

Sitewalk Report Datasheet



Summary Comments

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Appendix C – Full Survey Results

Response Index	Agency	Q1 -Your Info : What agency are you from and what do you do for that agency? Open-Ended Response	Q2 - Coverage: In what areas do you experience coverage problems? List as many as you can think of. Please note if the problems occur when you are using your handheld or vehicular radio (or both).
1	TRAX	Paratransit Services Bus Driver	Vehicle radio any where there are too many over head lines like telephone lines etc
2	TRAX	trax, trolly driver	both, diferant areas
3	TRAX	trax driver	every where
4	TRAX	trax, vehicle operator	cornig,vehicular radio sometimes not hearing all or part of tranmissions. having to repeat several times or have to stop and use other means of communications.
5	TRAX	Driver for Paratransit Services	All areas. In town or out of town
6	TRAX	Paratransit/Driver	I can't think of any particular area, it's intermittent from day to day in the same general area.
7	TRAX	Trax	Radio intermittent coverage
8	TRAX	Paratransit Services I am a Vehicle driver	Red Bluff, Diaryville, los Malinos, Proberta, Corning, Richfeild
9	TCSO	Sheriffs Office/ Deputy	Los Molinos/ Both
10	TRAX	Trax driver	vehicular. All over the county
11	TRAX	Para transit, Driver	parts along 99e.
12	TRAX	para transit services red bluff ca. driver	location weather wind overhead electrical lines and I don't know what else
13	DPW	Tehama County Public Works Fleet Maintenance Supervisor	I have not had any issues with coverage.
14	DPW	Tehama county public works	West of Red Bluff in area in canyons out of line of sight.
15	TCSO	Tehama County Sheriff's Office, Sheriff's Captain	Sun River at Hwy 36E, portions of Rancho Tehama, Highway 32, Mineral and the far west edge of the county.
16	TCSO	TEHAMA SHERIFFS OFFICE- ANIMAL REGULATIONS	IN THE OFFICE ON THE HANDHELD
17	TCSO	Tehama County Sheriff's department Facilities Maintenance	Handheld interference from state gps system
18	TCSO	Tehama County Sheriff's Office	Throughout county, varies with weather too
19	TCSO	Tehama county sheriffs department Correctional Deputy	None in the jail
20	TCSO	Tehama County Sheriff - Patrol	Tanglewood - both Rancho Tehama - handheld Los Molinos - handheld Mineral and East of Mineral - handheld
21	TRAX	Paratransit/driver	99E, St. E's hospital area, Gilmore Rd, Visitor Center, Walmart parking lot, Jackson Manor apartments, Luther Rd., Pine St.,
22	TRAX	Paratrainit bus driver	Sometimes it doesn't work good the radio is muffled. When GTC bus is in Leland or in Corning, You can't hear them. Some days the radio doesn't work at all.
23	TRAX	Paratransit Services/ dispatcher driver	in front of office, Los Molinos, Corning, West Red Bluff, North Red Bluff, all of Tehama County. I have problems with the dispatch handheld as well as the bus radios.
24	TRAX	Paratransit Services - General Manager	When in the dispatch office, the dispatcher is constantly trying to reach a driver, they either don't hear her at all or they hear a little. The driver says she is breaking up. It seems like it is everywhere the bus goes in Tehama County. All communications are through the base unit and vehicular radios.
25	TRAX	Paratransit Services Red Bluff, Ca Trax I am the morning Dispatcher.	It is hit and miss all over the county. Some radios only receive while others only transmit and sometimes they can hear the base and other times they can not. I usually have to call a driver 3 or 4 times before they can hear me. There are time I never hear the drivers so they have to pull over and call on a landline or a cell.
26	TRAX	paratrax	anywhere
27	TRAX	Paratransit Services, bus driver.	Vehicular. Some buses are good, some suck.
28	TRAX	Paratransit Services, I am the Operations Supervisor.	Well first of all we do not have handhelds at the moment, we used to with the old radios and we would like them back. Coverage is very Spotty, we can sometime get thru to the drivers and other times we cannot which is very frustrating for everyone. And its not just in Certain areas, it is all over, In Town of Red Bluff, Out thru Dairyville area and Los Molinos, And sometimes we think its the bus, but its the radio.
29	TCSO	Tehama county sheriffs office Patrol deputy	Rancho Tehama , Hwy 36 west
30	TCSO	Tehama County Sheriff's Office	Rancho Tehama/Los Molinos/Gerber/Paskenta/Vina/Platina/Tehama/Orland/Bowman/Cottonwood

Response Index	Agency	Q1 -Your Info : What agency are you from and what do you do for that agency? Open-Ended Response	Q2 - Coverage: In what areas do you experience coverage problems? List as many as you can think of. Please note if the problems occur when you are using your handheld or vehicular radio (or both).
31	TCSO	Tehama County Sheriff's Office Correctional Deputy	Anywhere near the jail with vehicle radios
32	TCSO	Sheriff's Office - Supervisor (Sergeant)	I mostly run the river (Boat Patrol) and coverage is spotty in the canyons. On the street both handheld and vehicle issues on 36 E between Stice and Dales Station,
33	TCSO	Tehama County Sheriff's Office/Patrol	Sacramento River, East and West Mountains, Los Molinos, Gerber, Antelope area, Jelly's Ferry near County Line, Manton, Payne's Creek
34	TCSO	Tehama County, Deputy Sheriff.	I have difficulty with my handheld radio throughout the county. Obviously the more remote areas, such as Manton, Mineral, Rancho Tehama, and some areas of Bowman and 36W I often have to utilize my car radio because my handheld will not transmit clearly.
35	TCSO	Tehama County Correctional Deputy	Both and when near someone else with a radio
36	TCSO	Tehama County SO, Patrol Division	Tanglewood Dr, Antelope Area, Los Molinos, Rancho Tehama, Pettyjohn Rd. Usually both have issues with in those areas
37	TCSO	Tehama County Sheriff, Deputy Coroner	Rancho Tehama, Both handheld and vehicle, Mineral/Manton - Both, Platina - Both, Parts of Cottonwood - Both, Mendocino National Forest - Both
38	TCSO	TCSO patrol SGT	Hwy 36 east, rancho Tehama, Capay
39	TCSO	Tehama County Sheriff's Office, Sergeant and emergency manager	Rancho Tehama, Mineral, Mill Creek, Down town Red Bluff, Antelope Blvd, just east of Hwy 36 and Antelope, lots of "skip" when driving I-5 near Thomas Creek (Mendo County?) inside Walmart or other large metal buildings

Response Index	Agency	Q3 - Capacity: Do you experience problems with talking over other users (or being talked-over yourself)? Under what conditions does talking-over each other happen?	Q4 - Channel Selection: Do you know what channels to use for normal operations vs for direct operations vs for interoperability?
		Open-Ended Response	Open-Ended Response
1	TRAX	PT drivers always talk over me when I try to call in a wheel chair or a person with a walker	Channel 1 is all I was told to use
2	TRAX	all, if one person is keying up and someone is doing the same, it will mess up	we do not have differant channels
3	TRAX	yes there is no notice when someone is starting to use the radio so there is a lot of walking over each other	yes
4	TRAX	occasionally	as far as I know
5	TRAX	Every now and then	No
6	TRAX	only one person can talk at a time from my experience, the radio won't let you talk if someone is already on the radio	no
7	TRAX	Both	We use one channel
8	TRAX	yes	no
9	TCSO	Static	Yes
10	TRAX	no. Hardly ever happens	yes
11	TRAX	no	no
12	TRAX	stepping on others transmissions has not been a big problem as all here are patient and sensitive to seek when all is clear	only one channel with present system channel 2 would now involve a phone call
13	DPW	The only problems we have had is that sometimes we get interference from Lincoln Fire.	Yes
14	DPW	we have have problems with Lincoln Fire bleeding over from time to time	we have tow ways to transmitting on local an car to car.
15	TCSO	Not generally, if so during a high traffic emergency situation.	Yes
16	TCSO	NOT TYPICALLY	NOT SPECIFICALLY, CHANNEL 1 FOR NORMAL OPERATIONS, OTHER CHANNELS ARE SPECIFIED AS NEEDED
17	TCSO	No	Yes
18	TCSO	Negative	TCSO 1/2 work about the same level of quality
19	TCSO	Not in the Jail	N/A
20	TCSO	On occasion, usually when we're trying to figure out who is responding to a call or when two Deputies want to do a traffic stop or go out at a call.	Yes
21	TRAX		Yes
22	TRAX	N/a	The radio is on paratrainit channel all the time.
23	TRAX	There are many talk over problems because so often nobody knows when someone is talking.	The only channel that we is the one for normal operations. The other channels are extremely difficult to change to while driving or regular office operations.
24	TRAX	Occasionally I hear a driver talking over another. The driver that interrupt's the other doesn't hear that the first person is already using the radio.	I believe there is a second channel but it is difficult for the drivers to get on it, so it is not used.
25	TRAX	We do not get a lot of talk over unless two persons hit the transmitter button at the same time. I can usually tell when that happens and I can call out to the drivers to repeat info.	Yes I do but the problem is there are 4 buttons and the drivers do not have time for that when they need both hands on wheel. We really need 3 separate channels, 1 for Paratrax, 1 for Trax, and one for emergencies.
26	TRAX	no	yes
27	TRAX	On occasion.	No.
28	TRAX	Often times yes other drivers will talk over the office staff because they did not hear us call out to another driver. Would be nice to have a Channel 2 as we used to but now it is not easy to switch and I feel it does not switch over even.	Yes We are supposed to have a Channel 1 and Channel 2. Channel 1 is supposed to be so everyone can hear and Channel 2 is for important things that we do not want brocasted to all drivers.
29	TCSO	Occasionally just depends on call volume.	
30	TCSO	Often usually with multiple units responding to a call	Yes

Response Index	Agency	Q3 - Capacity: Do you experience problems with talking over other users (or being talked-over yourself)? Under what conditions does talking-over each other happen?	Q4 - Channel Selection: Do you know what channels to use for normal operations vs for direct operations vs for interoperability?
		Open-Ended Response	Open-Ended Response
31	TCSO	Not really	Yes
32	TCSO	This happens frequently on patrol. If two units go on the radio we get stepped on. This is dangerous due to our line of work.	yes
33	TCSO	No sometimes in an emergency situation	Yes
34	TCSO	Usually we talk over each other when multiple people are responding to one high priority call. Or if several units are on different calls.	No.
35	TCSO	Yes	No
36	TCSO	Yes. During critical incidents.	Yes
37	TCSO	No	yes
38	TCSO	No	Yes
39	TCSO	"open mic" happens to us all the time with no way of identifying the radio or the user for "corrective" actions	yes

Response Index	Agency	Q5 - Channel Scanning: Do you use scanning frequently and, if so, does it help your operations? What channels/agencies do you typically scan? Is it easy to turn scanning off/on and to select a scan list?	Q6 - Radio Usability: Do you know how to operate all the controls and features of your radio? Are the radios and their accessories (speaker-mics, etc.) easy or hard to operate?
		Open-Ended Response	Open-Ended Response
1	TRAX	The scanning is done automatically	Yes I know how and they are easy to operate
2	TRAX	one channel	I know how to use cb radios
3	TRAX	no	sort of- easy
4	TRAX	no	yes, easy to operate
5	TRAX	No it is not easy to turn from one channel to another	Hard to operate
6	TRAX	no, I don't ever try to scan any channels	seems pretty simple. on/off I don't try to utilize more than that and the hand held mic
7	TRAX	no	yes. easy
8	TRAX	no	hard to operate
9	TCSO	NA	Yes
10	TRAX	no	yes easy
11	TRAX	no	no, yes
12	TRAX	not at this time	only the ones to be effective
13	DPW	I don't use the scanning option.	I understand all the controls and they are easy to use.
14	DPW	i don't think we have scan	yes
15	TCSO	No, I have an independent scanner.	Yes, easy once you know all the functions.
16	TCSO	I PREFER TO KEEP THE SCANNER OFF	I FEEL COMFORTABLE WITH THE CONTROLS
17	TCSO	Yes, TCSO channel 1 ans the TCSO Jail repeater.	Yes. Easy to operate
18	TCSO	I don't scan	Yes. 11-99 buttons are non operational
19	TCSO	N/A	Yes
20	TCSO	I keep my radio on TCSO channel one and use my scanner to listen to: chp, rbpd, cpd, medical and shasta so.	Yes
21	TRAX	N/A	Yes/easy
22	TRAX	No	No
23	TRAX	I do not scan channels. The radio system scans channels automatically when out of service, which is many times throughout the day.	The actual radio and accessories are easy to use. They just don't work.
24	TRAX	None	The dispatch controls are easy to use. The drivers should be easy with using only the mic.
25	TRAX	We really need a base radio that can scan but our systems radio right now does not scan. Our old system did scan and it was very nice. We also had handhelds which allowed for maneuverability.	Yes, I do know how to operate the radio but it is very difficult to switch between channels.
26	TRAX	no	no
27	TRAX	N/A	Yes.
28	TRAX	We do not use Channel Scanning, I think it might be set up for an Automatic Scan maby.	I know how to use most of it. But we were never taught how to use them correctly by the installer. which I find to be very unprofessional.
29	TCSO		
30	TCSO	Yes/ RBPD/CPD/Medical/CHP/CalFire	Speaker mics especially shoulder ones are useless

Response Index	Agency	Q5 - Channel Scanning: Do you use scanning frequently and, if so, does it help your operations? What channels/agencies do you typically scan? Is it easy to turn scanning off/on and to select a scan list?	Q6 - Radio Usability: Do you know how to operate all the controls and features of your radio? Are the radios and their accessories (speaker-mics, etc.) easy or hard to operate?
		Open-Ended Response	Open-Ended Response
31	TCSO	I did not know we had a scan function	I'm fairly familiar
32	TCSO	I do not scan on my radio. I use the scanner in my patrol car. I scan RBPD, CPD, CHP, Fire and add law enforcement agencies in the surrounding counties as needed. I do use my radio to scan the listed agencies when needed on the boat (no scanner installed).	yes
33	TCSO	No use a separate scanner	Yes
34	TCSO	I have a secondary radio installed for scanning only. I scan CalFire, Corning police, Red Bluff Police, and CHP. I do not attempt to select a scan list as I do not know much about programming.	I do not know how to use all the controls, but I can understand the basics and they accessories are easy to use.
35	TCSO		
36	TCSO	I scan daily for Red Bluff Police, Corning Police, Fire/Emergency, and CHP. We use a separate in vehicle scanner	Yes, they are pretty easy to use compared to like CHP radios with multiple repeaters and channels
37	TCSO	No	Not really
38	TCSO	Yes, Rbpd, CPD, chp, kinda easy	I do not. Lapel mics do not work to transmit out on clearly
39	TCSO	yes, I scan all the local agencies RBPD, CPD, CHP, Cal Fire and in my office USFS	No, so many features on the radios I don't know or use. I want to turn it on and have it function.

Response Index	Agency	Q7 - Possible Radio Features: What radio features would you like to be able to use in a future system? Please list any that you're aware of that you don't have now. Some possibilities are radio unit ID, emergency button, encryption, GPS-based location, send status/message, inhibit a lost/stolen radio.	Q8 - Interoperability: When you need to talk to someone outside of your own department, do you know how to do so on the radio? Are there any agencies that you need to communicate with via radio but that you can't? If so, who are they and what do you use to talk to them (cell phone, etc.)?
		Open-Ended Response	Open-Ended Response
1	TRAX	Would like to have a separate channel for PT drivers to use separate from bus drivers	No other agencies
2	TRAX	different radios such as drivers for public, drivers for pt	we can't
3	TRAX	pt on different system	no and none
4	TRAX	what ever is needed to communicate with dispatcher and other drivers	I use cell phone to call dispatch and they call if needed
5	TRAX	All of the above	I do not talk to any one out side of my department
6	TRAX	none come to mind	no
7	TRAX	none	N/A
8	TRAX	easy hang up, and reception	no
9	TCSO	Able to talk on both VHF and UHF	CHP They have to come onto our channel to talk to us but we can't go to there's
10	TRAX	doesn't matter	no
11	TRAX	n/a	no, no
12	TRAX	preset messages of the more used phrases to save time and to avoid the elipse that may occur when using speech	my concern is to effectively and clearly have communication with dispatch
13	DPW	GPS-based location	NA
14	DPW	GPS, scanning	would be nice to be able to communicate with the Sheriff office
15	TCSO	Radio unit ID and emergency button	Yes, sometimes when we get out of our area on a mutual aid assist for an emergency. Normally we use their radios (handhelds).
16	TCSO	I WOULD BE INTERESTED IN HEARING MORE ABOUT THE POSSIBILITIES LISTED	I USE MY CELL PHONE OR COMMUNICATE THROUGH DISPATCH WHEN I NEED TO TALK TO OUTSIDE AGENCIES
17	TCSO	Unit ID. Man down. Location. Text messages. remote radio kill	Yes. N/a
18	TCSO	11-99, GPS, encryption	Current functions are easy to navigate
19	TCSO	N/a	N/A
20	TCSO	I would like the 11-99 buttons to work in our cars and handhelds. I would also like dispatch to know which Deputy is keying the mic.	Yes I do. We can talk to everyone but CHP.
21	TRAX	N/A	Dispatch/use cell phone
22	TRAX	Be able to change channels by just by turning one switch.	The radio is only for bus drivers and dispatch. If we have something to say to dispatch. I pullover and call dispatch.
23	TRAX	All of the above.	We talk to emergency service through the office phones. It would be nice to use the radio system.
24	TRAX	one channel for the TRAX (fixed route system) and one channel for the ParaTRAX (Dial a Ride program) The dispatcher should be able to hear both channels at once, or the base radio should go back and forth when someone is calling her.	We don't have that feature. It would be nice to be able to have a type of conference call on the radio between a driver that calls in a problem, the dispatcher and an officer that needs information. An example would be an emergency on a vehicle or a driver witnesses an accident or hazard.
25	TRAX	We have none of the above that I am aware of right now. All of the above would be very useful especially GPS based location and unit id.	This is unavailable to us at this time so no I do not know how to use this at this time. Yes, first responders like sheriff fire and others would be helpful.
26	TRAX	channel 2. emergencies	yes, but I would like upgrade to be able to contact pd directly as well as an emergency button
27	TRAX	E-button	N/A
28	TRAX	Im not sure what all features we have now. But in the future I would like to be able to run our Paratrax side of it on its own frequency or Channel without having to have several different radios. Alos having GPS would be nice.	We often need to call upon the Police or Sherriff department. We use the main phone line to call them if needed. And no would not know how to do that.
29	TCSO		
30	TCSO	Emergency button/GPS-based location/inhibit lost/stolen radio	N/A

Response Index	Agency	Q7 - Possible Radio Features: What radio features would you like to be able to use in a future system? Please list any that you're aware of that you don't have now. Some possibilities are radio unit ID, emergency button, encryption, GPS-based location, send status/message, inhibit a lost/stolen radio.	Q8 - Interoperability: When you need to talk to someone outside of your own department, do you know how to do so on the radio? Are there any agencies that you need to communicate with via radio but that you can't? If so, who are they and what do you use to talk to them (cell phone, etc.)?
		Open-Ended Response	Open-Ended Response
31	TCSO	Radio ID, Emergency button- when pressed keys up mic for 10 seconds, gps based location and I would like a specific designated channel for the court team to use	I have not dealt with this
32	TCSO	All the features listed would be helpful (radio unit ID, emergency button, encryption, GPS-based location, send status/message, inhibit a lost/stolen radio)	We are unable to communicate with CHP. I will usually use cell phone or have dispatch relay to them when needed.
33	TCSO	Radio ID, Emergency Button, encryption gps location	Cal Fire Glenn Co SO Butte Co SO Fish and Wildlife
34	TCSO	I would like to have GPS based location so that in an emergency where I have a difficult time being heard during transmission, I can get help sent to me quickly and accurately.	I usually talk to them via cross traffic (we each stay on our own channel and listen to each other via the scanner). But if need me I can change the channel to their channel. Chp is the only one that I habitually call on the phone because of their complex and busy channel.
35	TCSO		
36	TCSO	Radio unit ID & talk-over prevention	Yes I use interoperability often. The only one we cannot speak with currently is CHP. Usually have to call their dispatch or the officer directly.
37	TCSO		No, usually go through our dispatch
38	TCSO	Unknown	We can talk to them, except chp, on radio. Otherwise we use cell phones
39	TCSO	identifying what unit keyed up, GPS on radios and cars, emergency button that works	CHP

Response Index	Agency	Q9 - Service: How well and how quickly are your requests for maintenance/service, either to issues with the system or your radios, addressed? Open-Ended Response	Q10 - Other Concerns: What else should we know about the radio system including how it could be improved in the future? Open-Ended Response
1	TRAX	Some times we can't communicate with dispatch	I my self would like to be able to be heard in case of an emergency. Some times I only hear one side of a conversation from other drivers. We have to call 2 or 3 times to be heard on the radio. We need to be able to communicate with dispatch in case we are in an accident or need the police to come to our bus for an unruly passenger. In case our bus is ever hijacked or some one attacks us we need to be heard. Our radio's as they are now are not dependable. Thank you.
2	TRAX	we have a good service for maintance/ and service	
3	TRAX	as soon as they can get to us	it filters to much we cant always have enough information come throu
4	TRAX	that's up to the office	make it to were we can communicater with less difficulty hearing each other with out having to repeat 2 or more times then have to call on the cell ohone
5	TRAX	Very quickly	Make sure they work ???????????
6	TRAX	not very good, I just tolerate the lack of ability or wait and try again later	headsets?/ for privacy from public hearing names and addresses
7	TRAX	Timely	
8	TRAX	don't know	we need better communication, most of the time no one can hear us and the audio is all mumbled
9	TCSO	Usually 1to 2 days	Being able to communicate/scan both VHF and UHF
10	TRAX	within my own company fairly fast	this radio system has not worked properly since first day installed
11	TRAX	don't know	to new to know
12	TRAX	very good	20 years of radio then text then push to talk then I phone to computer. have been steps that former employers have made.
13	DPW	They are addressed in a timely manner.	The only thing that I would like to see improved is adding the GPS option to the Radios.
14	DPW	as quickly as possible.	
15	TCSO	Average	A continuous plan to upgrade the radio systems instead of waiting until it is out dated to make changes. A county budget to allow for these upgrads.
16	TCSO	THE SHOP IS QUICK TO ADDRESS ISSUES AS THEY ARISE	
17	TCSO	Very quickly	VHF digital/Analog system RF linked to multiple repeaters (voting system).
18	TCSO	Not at all	Radio reception is poor throughout the county. Only tolerable near city limits
19	TCSO	Unknown	If the jail staff were issued radios that would also work on patrol. Since we go out on fires and events outside of the jail.
20	TCSO	I'm not sure.	I would like to see updated repeaters.
21	TRAX	Ongoing issues, maintenance has attempted to remedy the issues and to no avail.	Simply the ability to communicate w/dispatch and other drivers when necessary.
22	TRAX	None	The radio needs to have a farther reach and more clear signal with better clarity.
23	TRAX	I believe it's not real quick, but the calls are answered.	Please give us a new system. It is very dangerous for drivers to be out on the road and not have good working communication.
24	TRAX	Our current radio supplier is not responding quickly.	The reception needs to be constant and clear. We have drivers on the Dial A Ride calling in on their cell phones because they cannot get through on the radio. It isn't acceptable.
25	TRAX	I can call Day Wireless and they usually will get back to me within 2 hours but there are times when it may take a day or 2 to fix the problem.	Not in the future, but now Please. These are clear radios but basically useless. They create more frustrations than they are worth. Get me a new system now. Thank you
26	TRAX	good	having emergency button
27	TRAX	Soon.	Transmitting needs to be more powerful.
28	TRAX	Well they are addressed within our company by the mechanics. But as far as the people who installed them, they do not come and check things out to see if they can make things better for our service which having busses out there with radios that do not work is very frustrating and Scary for us.	We are very displeased with the whole system, not getting training on them to the not working all the time. They are very clear when they do work. Hope we can get a way better upgraded system to support our team. Thank you very much
29	TCSO		
30	TCSO	Varies on the issue and if personnel are available. Outside contractors tend to take quite a bit longer than in house.	Overall poor receiving and transmissions is frequent. Throughout the county there are known and unknown dead spots.

Response Index	Agency	Q9 - Service: How well and how quickly are your requests for maintenance/service, either to issues with the system or your radios, addressed?	Q10 - Other Concerns: What else should we know about the radio system including how it could be improved in the future?
		Open-Ended Response	Open-Ended Response
31	TCSO	Not at all	Adding a designated court channel
32	TCSO	no issues	Wireless (bluetooth) mics would be helpful. Some deputies have purchased them personally and like them
33	TCSO	Slowly	Needs a complete update and modernization
34	TCSO	I do not feel like our concerns are addressed quickly at all. There are some areas that have very poor radio reception due to the towers and equipment being old. It becomes an officer safety issue and is frustrating.	
35	TCSO		
36	TCSO	We've had issues for years with our radios and yet we still have the same poorly maintained system in place.	It's crucial for us to have reliable clear communications during emergencies and an upgrade to the system is needed ASAP
37	TCSO	Quickly if it can be corrected by our auto shop.	
38	TCSO	Unknown	Unknown
39	TCSO	??	