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2022-02-14 long lines in the Mojave

I have sometimes struggled to justify my love for barren deserts. Why is it that my favorite travel destinations consist of hundreds of miles of sandy expanse? Today, I'm going to show you one reason: rural deserts have a habit of accumulating history. What happens in the desert stays there--in corporeal form. Slow growth of vegetation, little erosion, and extraordinarily low property values turn vast, empty deserts into time capsules... if you spend enough time looking for the artifacts.

Also, we're going to talk about telephones! But first...

While the Mojave Desert was long open to homesteading claims, the extremely arid climate along with the distance to urban centers has always made the area challenging to put to use, and so has kept its population low. Places like Death Valley and Joshua Tree National Park are the best known Mojave destinations for their distinct geography and flora, but a different swath of the Mojave Desert began to attract a less formal sort of attention long ago. The development of the US Highway System, specifically highways 91 and 66, created a pocket of desert that was remote and yet still readily accessible from both Los Angeles and Las Vegas. Post-WWII, power sports (specifically dirt biking) lead to significant use of and impact on open land along highways. Combined, these created a bit of a contradiction: the empty desert was getting a little too crowded.

Through a series of political and administrative moves, the area of the Mojave desert roughly defined by US-91 to the north (now I-15) and US-66 to the south (now I-40 although the alignments vary) became first the East Mojave National Scenic Area of the Bureau of Land Management (the first such National Scenic Area established) and then, in 1994, the Mojave National Preserve of the National Park Service [1]. It is the third largest unit in the national park system, and due to its vast size, history, character, and perhaps most of all, miniscule budget, it remains surprisingly undeveloped and untamed.

Roughly in the center of the Preserve is a tiny town called Kelso. Kelso was established by the Los Angeles and Salt Lake Railroad (later part of Union Pacific) as a railroad depot and base for "helper" locomotives added to trains to help them make it up a steep grade eastwards towards the next tiny settlement, Cima. During its distinguished life as a railroad town, from the 1910s to the 1980s, it also supported a few surrounding mines. Elsewhere in what is now the National Preserve, many small mines, a few large ones, and a few major ranches made up the entire tiny population of the region. The nearest present-day town, Baker, has become little more than a row of gas stations and a surprisingly compelling Greek diner. In an earlier era, the multi-hour trip to Baker on horseback was the only connection to the outside world

available to miners and ranchers out in the desert. Back then it was like a different world, and today it largely still is.

Situated roughly halfway between LA and Vegas, in San Bernardino County, California, the Mojave National Preserve's more than one and a half million acres display two wars worth of military collaboration by the Bell System, two generations of long-distance telephone infrastructure, and four distinct types of long-distance telephone lines. There is perhaps nowhere else that one can gain as powerful of an appreciation for the feat that is the long-distance telephone call. A call to Los Angeles requires of you only dialing and waiting. First, though, it required teams of workers digging thousands of huge post holes by hand. The Mojave has been described as "a nowhere between two somewheres" [1]. This is true not only on the ground but also in the wires, as a large portion of telephone calls in and out of one of America's largest cities had to pass through one hundred miles of blowing sand. They still do today.

It's hard to say when, but we can safely how the first telephones arrived in the Mojave: by rail. The railroads made extensive use of telegraphy and, later, telephony. By the 1920s the railroad depot at Kelso, and later some of the homes of railroad employees, were equipped with telephones on the Los Angeles and Salt Lake Railroad's (LA&SR) private system [2]. While railroad telephones operated on separate, wholly railroad-owned infrastructure that was not interconnected with the Bell system, railroad telephone departments enjoyed a close relationship with the Bell System and largely used the same techniques with equipment from the same manufacturers.

The LA&SR would have installed a series of multi-armed utility poles, likely as part of the original construction of the railroad. While these poles would have initially carried only telegraph circuits, they later gained telephone circuits, signal logic circuits, and even "code" circuits which used an early form of digital signaling to communicate with trackside equipment. Many of these circuits would have looked substantially similar to open-wire telephone leads, because they were: railroads employed the same open-wire design that AT&T used.

Railroad telephones went through generally the same technological progression as public telephones. The first equipment installed would have been magneto phones. To make a call, you would turn a crank on the phone which generated a high voltage "ringing" signal. Once an operator noticed and connected to the line, you asked the operator to connect your call. Individual phones were expensive to install. As a result, the Kelso depot started with only a single phone in the dispatcher's office, along with the telegraph. At some point, this telephone was placed in a specially built rotating cabinet that allowed the station agent in the dispatch office to spin it around, presenting it through the other side of the wall for someone in the lobby to take a call [2]. The clever pass-through phone was probably designed by a local worker as a practical solution to the problem that dispatchers often called the phone wanting to speak to visiting train crews, but railroad security policy forbade anyone other than a qualified agent in the dispatch office. The station agent must have quickly tired of relaying conversations sentence-by-sentence through the window.

Later, as the technology progressed and more resources became available, the railroad connected additional phones to other buildings. These extra extensions most commonly appeared in the homes of senior staff such as the station agent and track gang foreman; they would be the only way to reach someone at the depot (or, for that matter, in the entire town of Kelso) during an after-hours emergency. In this era an "extension" was a literal extension of the existing wiring; all of these phones would have rung together. Kelso Depot also featured another clever solution to the

difficulties of reaching a remote employee before the widespread availability of radio: after the installation of electrical (CTC) signaling on the rail line, the dispatch office's semaphore display that once electromagnetically dropped flags to alert the agent that a train had passed a signal point approaching the station was rewired to drop a flag whenever the depot phone rang. This way, if the agent missed a call while attending to something outside of the office, they would at least know to call dispatch back when they returned [2].

Elsewhere, in 1915, the first transcontinental telephone line went into service. This line, generally from New York to San Francisco, passed through Northern California far from our area of interest. It ignited a fire that quickly spread, though, and the 1920s saw extensive construction of new long distance telephone lines in the West. In parts of Southern California, Pacific Telephone and Telegraph (PT&T) competed with the Home Telephone Company, until it acquired it. Much of PT&T's advantage over Home was its status as a member of the Bell System: Home had no long distance service. PT&T did.

The history of this early era is difficult to construct, as very few records remain and most of the artifacts have been removed. Around the Mojave National Preserve, though, two PT&T long-distance open-wire toll leads survive. One roughly paralleled US-91 (now I-15) from the area of Los Angeles (probably San Bernardino) towards, ultimately, Salt Lake City. This was one of the most important connections between the West Coast and the rest of the country.

Another, further south, roughly paralleled US-66 (now I-40). This was the fourth transcontinental line, constructed around 1938. Its Western terminus was likely Whitewater, which was less a town and more a particularly important telephone office in the early AT&T system. Whitewater is notable for existing in the territory of General Telephone & Electronics or GTE, a particularly long-lived non-Bell competitive telephone carrier. When GTE was later acquired by a Bell operating company, the two adopted the name Verizon. Back in the pre-WWII era, GTE's dominance in far southern California meant that AT&T had few actual customers but a great need to move long-distance traffic. Whitewater was thus a bit of an oddity: a major telephone office, in the middle of nowhere, with no customers but a surplus of traffic. At the other end, this southern open wire lead probably connected into Bullhead City or Laughlin, in the area of Needles.

Sections of both open wire routes remain and can be seen today. The northern one includes a particularly spectacular crossing of the freeway, employing a seldom seen today technique in which two steel "messenger" ropes suspended between stout poles hold up a series of wooden frames that substitute for poles and crossarms. These "floating poles" supported the actual telephone wires for the long canyon crossing. Today, a single multi-pair cable hangs sadly from the five-arm frames, apparently placed to provide telephone service to a nearby mine after the removal of the open-wire route. On the southern route, remaining poles are clearly visible from US-66 during its departure from the present-day I-40 alignment near Cadiz (itself an oddity, a town owned by a natural resources company with long-failed plans to pump and sell the groundwater to LA).

At the dawn of WWII, these two leads represented some of the only long toll leads on the West Coast. Following the attack on Pearl Harbor, Japanese invasion, or at least opportunistic sabotage, was a major concern for military planners. Concerningly, the handful of telephone connections between major western cities had poor redundancy and were mostly near the coast. They would be easy for a small team of Japanese soldiers, delivered by boat under cover of night, to find and destroy. This easy move would

effectively decapitate military leadership on the West Coast, impairing the ability of the United States to mount a defense. Here, years before the nuclear bomb or mutually assured destruction, survivable C2 and the telecom infrastructure to support it became a national priority [3].

In early 1942, and in collaboration with the War Department, PT&T embarked on a project that would rival the first transcontinental: a new wartime long distance route called the Defense Backbone Route, or DBR. Over a span of under a year, with a monumental level of effort ranging from logistical innovations to the sheer manpower of hundreds of laborers working from roving camps, the DBR's open-wire spanned nearly 900 miles from the Mojave desert to Yakima. Most importantly, its entire route was well inland (including a large stretch in Nevada), making it difficult for any military force arriving via the coast to reach. The DBR presaged later developments like the L-3I by providing a survivable toll lead dedicated to military use, particularly for the purposes of defense and reprisal.

The southern terminus of the DBR is sometimes described as Los Angeles, but that seems to have been only by interconnection to the existing open-wire lead along US-66, south of the Preserve. The DBR itself ends at a location optimistically described as Danby, California, although Danby is not much of a town and the end of the DBR is not that near it. The "Danby" station, consisting of one small building which presumably originally contained carrier multiplexing equipment, is still there today, and seems to still be in use with an added microwave antenna. As we will see, telephone infrastructure in rural areas is often reused for cost efficiency. It appears that there are still active customers served by a modern multipair telephone cable installed using the open-wire route's right of way, and the Danby station remains with a microwave link to provide local loop connections to these customers.

From Danby, the DBR continued northwest and then north, almost right through the middle of the present-day Preserve. It wanders through valleys, passing within a few miles of Kelso, before reaching the northern open-wire lead at US-91, which it joins to head towards Las Vegas. The poles and wire of the DBR remain largely intact within the Preserve and can be seen from Kelbaker Road (shortened from Kelso Baker Road), in Kelso and on Kelso Cima Road, and later where it crosses the Mojave Road and numerous dirt mine and ranch roads. It can even be seen from I-15 if you look carefully, although the span near I-40 has been removed.

Not so long after the DBR was constructed, and shortly after it was converted to civilian use, the owners of the Cima mine (a small cinder mine in what is now the eastern portion of the Preserve) contacted PT&T or AT&T to request a telephone. Under a California law, PT&T was required to furnish telephones for use in very rural areas where no other phones existed. At the time, it was a multi-hour trip from the Cima mine to reach Kelso or Baker where, in an emergency, help could be summoned. To improve safety, but moreover to comply with California law, AT&T came to the desert with a "toll station." Toll stations, an artifact of the early phone system no longer seen today, can be thought of as telephones that are a long distance call from anywhere. Toll stations were used to connect very rural areas, and were often located on party lines and required operator assistance to call. The reason for these oddities is simple: toll stations were connected directly to long-distance wires, not via local exchanges, and so they represented an odd exception in the general architecture of the telephone system. On the upside, they were far easier to install in very rural areas than conventional local telephone service.

In 1948, the Cima mine's requested phone was unceremoniously placed dead center in the middle of the desert. Located at the intersection of the DBR and a dirt access road,

the new phone was still some way from the Cima mine but much closer than any town. It was a magneto phone connected directly to the DBR (likely using the “voice frequency” or non-carrier “channel” of one of the sets of pairs). Lifting the handset and turning the crank prompted a long-distance operator in San Bernardino to pick up and ask where the user wanted to call. If one wanted to call the phone, they would have to ask their operator to be connected to the San Bernardino long distance operator, and then ask for the phone by name. The long distance operator would ring the phone, and someone would have to be waiting nearby. It is said that some local user left a chair by the phone, as a convenience to those waiting for incoming calls. Telephone users would sometimes adopt a regular schedule of visiting the phone during set hours in case someone wanted to reach them. Locals driving by the phone on the dirt road would roll down their window, just in case it rang, so that they could take a message that would almost certainly be for someone they knew. While far from convenient, it was the only phone service for both mines and ranchers in the area [2,4].

This lonely phone would prove to have remarkable staying power. The owners of the Cima mine seem to have continued to use it as their main telephone into the ’90s. Over time the phone was modernized to a more conventional payphone and given a more conventional switching arrangement and phone number. In 1997, after a series of chance discoveries, it came to be widely known in counter-cultural circles as the Mojave Phone Booth. It was difficult to comprehend: an aluminum and glass telephone booth, in a way a symbol of modernity and urbanism, sitting in a lonely desert impossibly far from the civilization it connected to [2,4].

The phone booth’s sudden fame, and significant increase in users, lead directly to its demise. Some combination of Park Service concern about environmental impact by visitors to the phone booth and upset by a local rancher who didn’t appreciate the raucous visitors lead to its removal in 2000. Today nothing remains of the Mojave Phone Booth except for the DBR itself. Its segment in the northern Preserve, apparently maintained to keep the single connection to the phone booth, is still in good shape today (albeit with only one crossarm remaining) [2]. Unfortunately, while the Mojave Phone Booth is widely described in media ranging from Geocities-esque phone phreaking websites to an episode of *99% Invisible,* few people know that the cross-desert phone line its wires once hung off of was itself an oddity, an artifact of WWII which had been hidden from the Japanese in the desert. The Mojave Phone Booth was a contradiction in an even deeper way than it might first seem: a phone placed for convenient access along a phone line placed specifically to avoid convenient access. That is how you get a phone booth in the middle of nowhere.

Elsewhere along the DBR, World War II had ended but the Cold war was just beginning. Early in the Cold War the greatest fear was the delivery of nuclear weapons by bombers. Air defense, before mature radar technology, was a difficult problem. In the style successfully employed by the UK during the battle for Britain, the Air Force established a Ground Observer Corps (actually the second, after one which operated during WWII). The Corps consisted of volunteers who, when activated, would search the sky by eye and ear for enemy aircraft and report them to a “filter center” where such reports were correlated and forwarded to the Air Defense Command.

Being the only thing for a very long ways, the Kelso railroad depot was an obvious choice for a Corps observation post. While not recorded, the volunteers were probably railroad employees who lived in railroad-provided housing in Kelso. There was one problem: the observers would need a telephone to report their sightings to the filter center, and the filter center was not on the railroad telephone network. As a result, the first public network telephone was installed in the lobby of the Kelso railroad depot in 1956 [1,2]. It is unclear today how exactly this phone was connected. I

find it likely, although I cannot prove, that it was connected via railroad open-wire leased by AT&T and tied into an AT&T exchange in a larger town. It is also possible that it was a toll station attached to the DBR much like the Mojave Phone Booth, although inspection of the cabling which now exists from the DBR to Kelso suggests that it is a much newer connection than 1956.

In 1974, the Kelso depot phone was apparently still in service although it was likely connected differently (as we will later discuss). A railroad employee, responsible for the operation of the Depot, requested that PT&T move the phone outside under a covered walkway so that it would be accessible 24/7 after they introduced the practice of locking the depot doors at night (this on the advice of a UP police Special Agent who feared a midnight robbery of the depot's small restaurant, formerly 24/7 but by then closed nightly). There was, reportedly, also a phone at Kelso's small general store, across the street from the depot, which likely shared the line [2].

The DBR thus served two local telephones within the Preserve in addition to long-distance traffic. There is some reason to believe that the payphone, at least, was on a party-line circuit shared with phones installed in the homes of some local residents (probably ranch houses relatively near the DBR). The Kelso phone may have been as well, or may have been party-lined with other phones in railroad facilities if it was indeed on leased railroad open-wire. The general pattern of an open-wire toll lead with a single party line used to connect a few toll stations for local users was common in very rural areas at the time. Not just ranch houses and mines but also rural gas stations and businesses relied on this type of service, as toll leads often followed the same highways that rural businesses clustered near.

The Cold War would have a much bigger impact on the Mojave than a phone in the Kelso depot, although the introduction of telephone service to such remote sites as the Mojave Phone Booth and even the Kelso Depot (which did not even have an electrical connection, relying instead on a small on-site power plant operated by the railroad until 1960) was no small feat. The need for long-distance capacity between Los Angeles and the east had grown exponentially. More troubling, the genesis of nuclear weapons and the doctrine of mutually assured destruction created an exponentially greater need for fast, reliable, and survivable telecommunications. The "Flash Override" button on the President's telephone, intended foremost for use when ordering a nuclear strike, would be useless without a telephone network that could connect the President to their military branches... even after nuclear attack, and even through the remote Mojave.

Southern California, outside of its major cities, was rich with military installations (a result in part of the extensive use of the Mojave for WWII training) but poor in infrastructure. This created a particular challenge: in Southern California AT&T suddenly had a bevy of customers for AUTOVON (the Automatic Voice Network, a survivable military telephone system operated by AT&T on contract to the War Department), but very few customers for civilian service and thus very little capability to connect new phones. The Mojave needed strong telephone infrastructure, and it needed it very fast.

I feel fairly confident in stating that the greatest single achievement in the construction of AUTOVON, if not of the entire history of survivable military communications, was the L-3I transcontinental telephone line. This coaxial cable, analog, high capacity toll lead, installed mostly in 1964, could carry thousands of calls from coast to coast. Moreover, it was completely underground and hardened against nearby nuclear detonations. Manned L-3I support facilities, which were found every 100 miles, were underground bunkers staffed 24/7 and equipped with supplies for

staff to survive two weeks in isolation. Because it was impractical to harden such facilities against direct nuclear attack, their survivability relied in part on remoteness. The L-3I was intentionally routed through rural areas, well clear of likely targets for nuclear attack. At the same time, it needed reliable connectivity to military installations that were almost certainly targets. This required a hybrid approach of both the hardened L-3I and multiple, redundant connections of other types.

The L-3I transcon adopted a southern route in the western United States and dipped into the western edge of Texas before crossing through the Southwest: New Mexico, Arizona, and then Southern California. There was an underground L-3I “main station” at Kingman, Arizona, after which the cable crossed under the Colorado River at Riviera and proceeded almost directly west into the Preserve. The L-3I cable passed about eight miles north of Kelso, roughly parallel to and not far south of the Mojave Road. After a northern jog it turned back west south of Baker until it met US-91, now I-15, and followed the highway to Beacon Station (which appears to be a former CAA intermediary airfield) where the next L-3I main station is found just north of the freeway.

L-3I cables were buried underground (actually pushed directly into the ground by means of a special plow), but their presence was clearly indicated on the surface by repeater stations and right of way (ROW) markers. Repeater stations were installed in buried concrete vaults every four miles, but a metal hut was installed on top of each vault to house test equipment and provide technicians a clean and dry workspace. ROW markers consisted of frequently placed tall wooden posts with orange metal bands wrapped around the tops, intended both to help repair crews locate the cable in the ground and to warn farmers and construction workers to dig with care.

In the Mojave, though, none of this can be seen today. The L-3I cable saw use through the Cold War, carrying both military and civilian traffic. In the ’80s, it was upgraded to carry a digital protocol called P140. The 140Mbps capacity of P140 was limited, though, and the L-3I cable required significantly more maintenance and support than the fiber optic technology increasingly used by 1990. In 1997, AT&T disclosed its intentions to fully abandon the L-3I cable west of Socorro (although portions of the ROW would be reused for fiber). In response, the NPS and BLM performed an environmental analysis on abandonment of the cable in federal land. The analysis revealed several potential long-term environmental impacts from not only the cable and repeaters but also the ROW markers themselves. The marker posts provided an ideal perch for birds of prey, in a desert environment that offered very few other tall objects. The effect was increased predation of small animals, a particular problem for several endangered species in the region.

To mitigate the problem, the NPS required an effort that was rather unusual for L-carrier routes: complete removal. Repeater huts, vaults, ROW marker posts, and the cable itself were all demolished and hauled away throughout most of Arizona and California. Today, all that remains of the L-3I in the Preserve is the still visible scar of the trenching and excavation, marked on many maps as “Utility Road.”

The western destination of the L-3I cable was the L-3I Main Station at Mojave, around one hundred miles west of the Preserve, which despite the retirement of the L-3I has grown into a large complex that remains an important long-distance switching center today. The AUTOVON switch at Mojave connected via microwave and buried cable to a long list of cities and military installations in Southern California.

Microwave radio systems can move large numbers of telephone calls over point-to-point radio links. Because they avoid the need to run cable through many miles of land,

microwave can be a much more affordable option for long-distance telephone infrastructure. As a downside, the microwave technology of the time (called TD-2) could carry fewer calls and required a line-of-sight of generally under 50 miles between stations. To extend this range, simple stations called relays received a signal on one side and transmitted it again out the other. The microwave antennas used at the time were large, heavy, and required fairly regular maintenance, all of which made very tall towers impractical. Instead, to find a line of sight, microwave facilities were built on peaks and in high mountain passes.

Much of the microwave telephone infrastructure in the area of the Preserve was built at the same time as the L-3I cable, as both were part of the same larger AUTOVON project. The L-3I was a high-capacity, high-durability, but high-cost backbone, while microwave links were a more affordable technology that used redundancy rather than physical strength to ensure reliability. The lower cost and greater flexibility of microwave also made it ideal for shorter connections between the telephone network and defense facilities, encouraging more local microwave stations. This is why the mid-1960s AUTOVON effort lead to the creation of not one, but three independent east-west long-distance routes through the area of the Preserve: the L-3I cable, a northern microwave route, and a southern microwave route.

Although they were relatively inexpensive, microwave stations were not left undefended. AUTOVON microwave facilities were above ground but used hardened building techniques including thick concrete walls, blast shielded vents, and reinforced towers and antennas to survive nuclear strikes at a moderate distance. Most microwave stations were simple relays that operated unattended except for periodic visits by maintenance technicians, but larger stations with switching equipment were staffed 24/7 and supplied for two weeks of isolation, much like L-3I main stations.

The center of the microwave network in the Mojave, if not all of Southern California, was a remote mountaintop site called Turquoise. Located just north of the preserve, about five miles north of I-15 at Halloran Springs, Turquoise was a staffed facility with an AUTOVON switch. Its squat square tower bristled with horn antennas. Every day several shifts of exchange technicians made their way up Halloran Springs Road to the site and supervised the switching of military and civilian calls to destinations throughout southern California, as well as onto the L-3I and other cables for cross-country transit. Turquoise had direct or indirect connections to four different major long-distance microwave routes. As a secondary function, Turquoise included Ground Entry Point antennas for a system called ECHO FOX that provided radiotelephone service to Air Force One... directly to AUTOVON, for use in a nuclear emergency if necessary [6].

One pair of antennas on Turquoise's crowded tower pointed south towards a station called Kelso Peak. Kelso Peak, located in the Preserve a little under ten miles northwest of Kelso, served as a relay station on both a north-south route (north to Turquoise) and an east-west route (west to Hector, a relay not very close to anything but perhaps closest to Ludlow).

To the east, Kelso Peak connected to Cima, another AT&T relay in the Preserve. Cima station sits on a hill five miles due East of the town of Cima, and relays traffic northeast to a station in Nevada, almost to Las Vegas, charmingly called Beer Bottle.

To the south, Kelso Peak connects to the Granite Pass station. Granite Pass is directly next to Kelbaker Road 14 miles south of Kelso. Across Kelbaker Road from the Granite Pass microwave station is a much smaller tower installed by the National Park Service to relay internet and phone service to Kelso today. South from Granite Pass,

the next station is Sheep Hole, south of the preserve and northeast of Twentynine Palms.

Putting these stations together, the northern east-west telephone route through the Mojave runs north of the preserve mostly parallel to I-15. The southern one (actually perhaps better called the "middle" route as there is yet another further south and nearer to Joshua Tree National Park) runs through the center of the Preserve, and would be visible on the horizon just north of Kelso if you could see microwaves. The north-south route runs directly through the western side of the Preserve.

Construction of these stations in 1964 was a formidable project. Crews from Southern California Edison installed many miles of new power lines, starting from Kelso and running outwards, to bring power to the Granite Pass and Kelso Peak stations (Kelso itself had only been connected to the grid a few years earlier). The microwave stations, like the L-3I cable, were built by PT&T crews for AT&T Long Lines. Crews from both SoCal Edison and PT&T occupied employee hotel rooms at the Kelso Depot while performing work, often for months long stays that irritated the station agent and stretched the depot's capacity to house and feed [2].

Each of the AT&T stations in the Preserve, like others in the Mojave, included an unusually large gravel apron around the facility. This leveled gravel lot served as a helipad; due to the remoteness of the facilities maintenance technicians were delivered by helicopter. The sandstorms which sometimes occur in the Preserve posed a maintenance and reliability challenge, and maintenance crews were kept busy.

Along with the L-3I and TD-2 came the end of open-wire, but in such a remote area it's hard to really tear out old infrastructure. Instead, when the decision was made to decommission much of the open wire by 1989, alternative arrangements were made for the few local customers once served by the DBR. South of Granite Pass and north of Kelso portions of the DBR were removed, but the Granite Pass microwave station was connected to the DBR open-wire as it passed by. East of Kelso where the DBR crossed the railroad, a section of new wire was used to connect pairs on the DBR to pairs on the railroad open-wire, which was removed except between the DBR and Kelso. The result was a direct local loop from the Kelso phones to the Granite Pass microwave station, a very unconventional setup to avoid the need for a new phone line to Kelso. A 1924 rail depot connected to a 1964 microwave station by reuse of a 1942 open-wire toll lead: the kind of thing you run into in the desert.

The phone booth seems to have found an alternate arrangement. The DBR was removed for a span north of Kelso, disconnecting the phone booth from the span to Granite Pass. Instead, the phone booth seems to have been reconnected along old DBR wire pairs to somewhere further north, likely Baker, where the phone booth had been assigned a regular local number.

Because of these two legacy arrangements, large spans of the DBR have remained intact in the Preserve to this day. On Kelso Cima Road just east of Kelso, the intersection of the DBR and the railroad can be seen, including the somewhat awkward interconnection of the DBR to the railroad open wire. Just north of this point the DBR abruptly ends, the remaining wires tied around the base of the last pole. The DBR is only absent for about two miles though, follow its route north and the poles will start again just as abruptly as they ended. 16 miles further, the ghost of the phone booth sits under the poles of the former DBR. Look carefully and you can see many details of this old infrastructure. I have posted a few photos I took at https://pixelfed.social/jbcrawford, although I intend to get better and more thorough ones on a future trip.

Today, the original TD-2 microwave equipment is long removed, and some of the large KS-15676 horn antennas have been removed as well (although they remain at some sites including the highly visible Granite pass). Even so, radio sites, once built, have a tendency to live on. Most of these microwave sites are still in use, either by a telco or under ownership of a leasing company such as American Tower. The remoteness of the Mojave means that radio remains an important technology and many of these microwave sites still carry telephone calls, using more modern equipment, and either as the primary route to some rural telephone exchanges or as a backup in case of damage to buried fiber optic lines. The late life of these facilities can sometimes be confusing. At Granite Pass, a much newer tower and small utility enclosure on the west side of Kelbaker road, next to the small NPS relay, are used by AT&T for telephone service. The original AT&T tower on the east side of the road is no longer used by AT&T but lives again as a relay site for the Verizon Wireless microwave backhaul network, which provides cell towers their connection to the rest of the phone system. Many microwave sites have also been reused as cellular towers.

Various newer telecommunications infrastructure can be found within the Preserve as well. At the town of Cima, a large radio tower erected by Union Pacific provides radio communications with trains and trackside equipment. Smaller towers found up and down the railroad link trackside equipment together as a replacement for the old open-wire lines. Just south of I-40 near the Essex exit, a modern small microwave relay site provides backhaul communications for several cellular carriers on solar power alone. At Goffs Butte, a conspicuous cinder cone south of Goffs, a busy radio site includes cellular and telephone microwave relays alongside broadcast radio stations. Cellular towers at Baker, Mountain Pass, Goffs, Ludlow, and others now provide coverage to some, but far from all, of the Preserve.

There is a very real sense, though, in which modern telecommunications technology has still failed to tame the desert. Satellite networks such as Globalstar and Iridium can be reached throughout the Preserve, but slowly and at significant cost. Cellphones are unreliable to unusable in many parts of the Preserve, and there are few landline phones to be found. Despite all of this infrastructure, the Mojave is still far from civilization. That’s another great thing about the open desert, besides the memories it keeps: it’s hard to get to, and even harder for anyone to bother you once you’re there.

[1] “From Neglected Space to Protected Place: An Administrative History of the Mojave National Preserve,” Eric Charles Nystrom for the National Park Service, 2003.

[2] “An Oasis for Railroaders in the Mojave: The History and Architecture of the Los Angeles and Salt Lake Railroad Depot, Restaurant, and Employees Hotel at Kelso, California, on the Union Pacific System,” Gordon Chappel et al. for the National Park Service, 1998.

[3] “DBR: ‘Damned Big Rush’ or the Building of the Defense Backbone Route,” The Electric Orphanage. https://the-electric-orphanage.com/the-damned-big-rush-or-building-of-the-defense-backbone-route/

[4] Correspondence, Telephone Collectors International mailing list.

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