**Texas New Mexico Power Company**

**2461 Hwy 6 East**

**Alvin, TX 77511        Fred R. Marshall**

**Senior Consultant**

        1122 Post Rd.

        Carencro, LA  70520

Ms. Marlene H. Dortch, Secretary

Federal Communications Commission

445 12th Street SW

Washington DC 20554

**Re:     GN Docket No. 17-183, *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz***

**ET Docket No. 18-295, *Unlicensed Use of the 6 GHz Band***

***Ex Parte* Communication**

Dear Ms. Dortch:

I am filing this letter on behalf Texas New Mexico Power Company (TNMP). TNMP operates 26 active licensed 6 GHz stations.

The proposal for shared use of 5925-7125 MHz on an unlicensed basis have potentially catastrophic unintended consequences. Alternative methods exist and should be used first.

***Coordination with Unlicensed Users Is Rarely Successful***

**Indoor Use Only Notices Are Not Effective**

Indoor use only notices are effective for legal liability purposes. RF is unaware of indoor vs outdoor. Consumers do not care indoor vs outdoor. They generally do not start by reading the instructions for placement of a device before purchase. Users will try it on their porch, patio, garage, or shop. After it is up and working, they will not discontinue use because of a usage notice in the manual they never read. For instance, for UL compliance purposes, wired Ethernet routers and switches are listed as indoor only. Multi-building locations, such as churches, often run wire between buildings, or to a garage or barn. It works well, until it fails, then is replaced with a new similar unit, again ignoring the indoor only usage notice.

**Gradual Degradation**

AFC is not an answer. Once an access point begins operation there is no provision to remove it, so in essence the band will gradually fill with immovable unlicensed signals, over time eliminating the band from additional use for its currently intended purpose.

Propagation varies widely with time. Signals are frequently transmitted well beyond the intended paths due to weather and tropospheric anomalies.  These are interferors on an itinerant basis. Since they are transient, no protection is afforded by coordination. The fixed point to point world moves to a different frequency after long and arduous tracing of the problem. With unlicensed operation, the situation is sufficiently difficult to defy solution.

**Consumer Users Ignore Regulations**

Poorly regulated sub bands do not work. Example: Citizens Radio at 27 MHz was intended to be an orderly short range communications system. Instead, it is an example of chaos. The FCC has been unable to regulate that mess for decades.

***Unintended High Impact Consequences***

Electric utilities use 6 GHz extensively for both SCADA and protective relaying. Relaying systems suffer potential failure if interruptions of more than 3 milliseconds occur. For effective protection, faults must be detected, categorized, located, action determined, command to disconnect sent, transmitted, detected, control signal sent to the circuit breaker, then tripped, and the arc cleared within 6 cycles.  The occurrence of the disturbances requiring the function of relaying are totally unpredictable. Thus, time sharing of spectrum space is not possible. Ping-pong (single frequency) systems are therefore unsuitable.

The disasters potentially caused by relaying failures come to millions of dollars and potential civil disorder.  The August, 2003 Northeast power outage was an example of a simple problem that cascaded to millions. Since power was restored in a couple of days, the civil disorder was minimized, but should such an outage occur for longer than that, a really serious civil disorder problem would ensue.

The study on the effects of a major power outage <https://www.dhs.gov/publication/niac-catastrophic-power-outage-study>  gives some perspective on the potential problems. The problems should not be exacerbated by interference from short haul individual links.

C-band earth stations require a very quiet location to be functional. Even tiny received signals can block an LNA and IF chain.  The proposal suggests coordination, but does not provide for expansion of existing systems.

Cellular carriers use and expand the use of 6 GHz daily. The expansion of systems over distances greater than 7 miles path length would suffer.

The petroleum industry depends on the 6 GHz band for control of pipelines, to avoid the potential environmental disasters that would occur if perturbations were to occur.

**Unlicensed Operation Fills The Spectrum**

Experience shows that at 2.4 GHz, the utility cannot operate even short communication links due to congestion in “underserved locations”. A recent operation in an ‘underserved area’ (Pecos, TX), even on a temporary basis gives an example of interference from unlicensed services. Normally the radios in use work with very low signal levels in the order of 80 dBm.  Signal to interference ratios of 20 dB normally function well. Signal levels of -60 dBm had worse than 10-3 error rates (non-functional). These were unsuitable for any communications, much less teleprotection. 6 GHz licensed space diversity operation was the replacement. If the band gets taken away from power companies by usurpation, another move will be necessary.

**Modern Point to Point Radios use ATPC.**

Modern Point to Point radio systems use automatic transmitter power control (ATPC) to reduce the transmitter’s power output to a value that just produces the required bit error rate. Often the reduction of power is in excess of 15 dB The system now works quite well, but will fall victim of one watt unlicensed transmitters.  The permitted power of the unlicensed radios should be reduced to +15 dBm from the proposed +30 dBm to make the interference problem solvable.

***Alternative Solutions***

The consequences of the use of unlicensed radio on major communication systems in places where a wire or fiber will do are severe.  Individual users face a problem of CAT5 or CAT6 cable at a few dollars per location for indoor distribution. It is obvious that the uneducated user likes radio. It provides a good cure for the people who have a very deficient education.

Radio distribution is also good for use within the cities where the law of the jungle exists. We understand that technicians are sometimes in mortal danger when maintaining communication systems, but that should be cured without spectrum redistribution.

or…

The manufacturers could buy out the 6 GHz users like the cellular carriers did 10-15 years ago to the 2 GHz users. At the current 6 GHz usage, (more than 47000 routes for all users) the routes might be replaced with fiber optic service. A price tag of 36.4 billion dollars based on 15 miles per `hop and $10 per foot (acquisition and installation) and a construction interval of 15 years seems justifiable.

No fiber or other substitute for satellite services has yet been found.

or...

Another method would be to indemnify the users against failures caused by interference with a manufacturer pre-paid fund of at least $40 billion.

or...

There should be spectrum space in the region above 13 GHz that will perform the function of the same quality indoor communications that would be provided by the proposed service.

or…

We are told that this will provide service to rural America. Indeed in the last century, the Rural Electrification Administration (REA) financed the installation of electric power and telephone service. The bureaucracy maintained the subsidy.  Money from service taxes could finance fiber service to the rural area under served in the same way as the copper version of the previous era.

**Summary**

Since the manufacturers are so sure that these devices will not cause interference, they should stay in the bands currently assigned to ISM. After all, they say that there is no interference.

It seems that the consequences of the “sharing” of the 6 GHz point to point band are overpowered by the consequences. We should not jeopardize our lives to make an (overseas) manufacturer some money.

**Fred R. Marshall** has been involved with design, frequency coordination, licensing, construction, installation and maintenance of 6 GHz communication systems since 1966. Experience also includes 2.1 GHz, 2.4 GHz, 5.2 GHz, 5.8 GHz, 5.9-7.1 GHz, 11 GHz and 19 GHz systems.