Utilities Technology Council™

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June 28, 2019

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 - 12th Street, S.W.
Washington, D.C. 20554

Ex Parte

Re: Notice of Ex Parte Presentation, ET Docket No. 18-295, GN Docket No. 17-183.

Dear Ms. Dortch:

The Utilities Technology Council ("UTC") is providing the following ex parte notification in the above-referenced proceeding in accordance with Section 1.1206 of the Commission's Rules. On June 26, 2019, Christina Baworowsky from Alliant Energy, Ben Portis and James Ryan Harfield from Entergy, Brian O'Hara from the National Rural Electric Cooperative Association, John Gregory and Maggie Zhou from Los Angeles Department of Water & Power (by phone), Matt Schnell from Nebraska Public Power District (by phone), Roger Bryant, Larry Butts, Andy Mills, Andy Collins and Marvin Simpson from Southern Company (by phone), David Hoover from TheFergusonGroup.com (on behalf of Southern California Public Power Authority and the Modesto and Turlock Irrigation Districts), Doug McGinnis from RedRoseTele.com and Sharla Artz, and the undersigned from the Utilities Technology Council (collectively, the "parties") met with Michael Ha, Jamison Prime, Barbara Pavon, Bahman Badipour, Nick Oros, Syed Hasan, Aole Wilkens, Hugh VanTuyl and Greg Callaghan from the Office of Engineering and Technology to discuss matters related to the above-referenced proceedings.

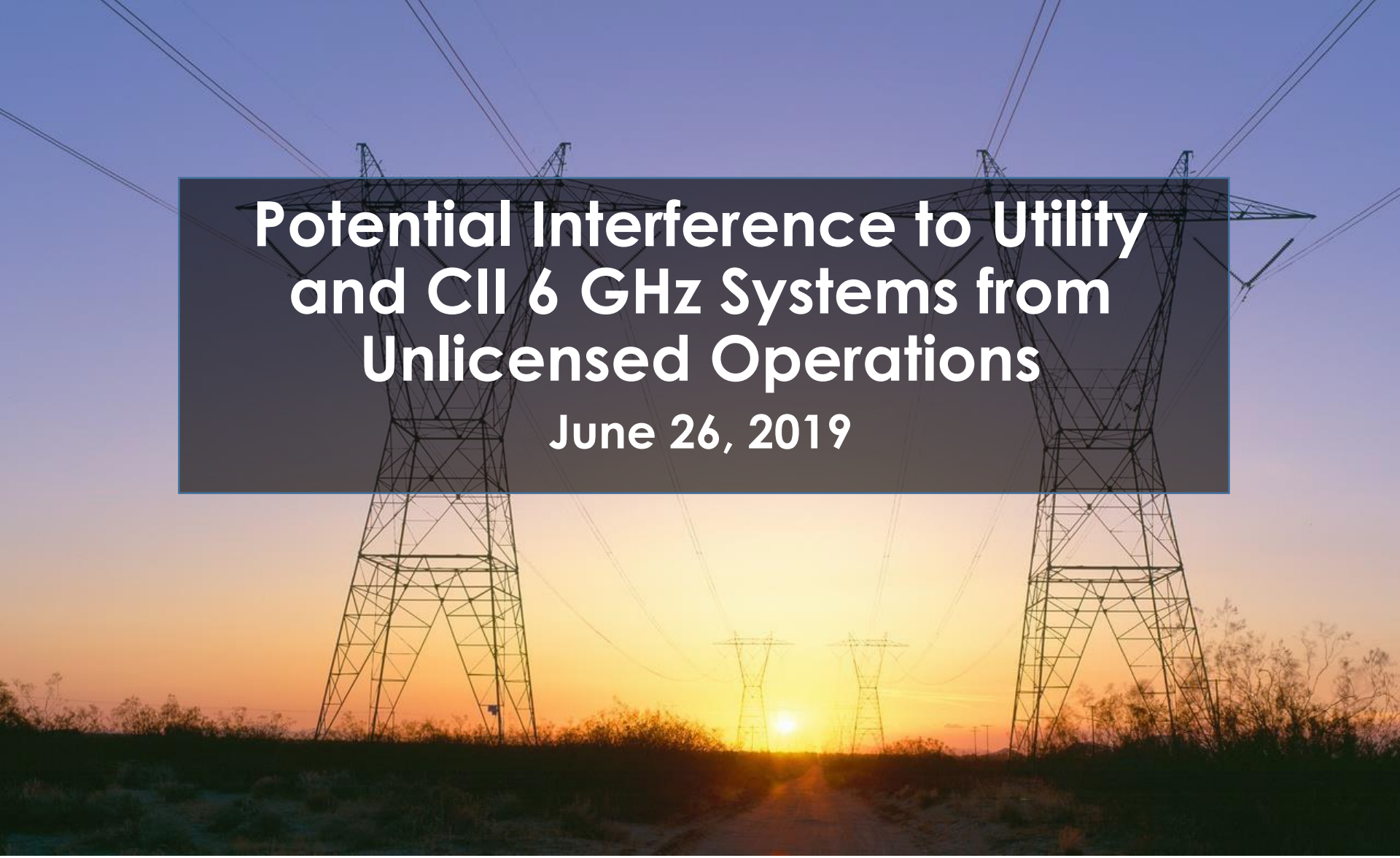
During the meeting, the parties provided the attached presentation and explained how utilities and other critical infrastructure industries operate extensive microwave communications systems in the 6 GHz band, which they use to support the safe, reliable and secure delivery of essential services. Owing to the criticality of these services, their microwave systems are designed, built, and maintained to operate at extremely high standards for reliability and low latency. Potential interference from unlicensed operations represents an unreasonable risk to the performance of these microwave systems in the 6 GHz band, and the parties explained that interference must be prevented rather than fixed after the fact. Specifically, the parties explained how both indoor and outdoor unlicensed operations pose an interference threat. In addition, the parties described various additional issues, including the need for enforcement mechanisms in the event that interference occurs, as well as the need to develop, test and certify automated frequency coordination (AFC) systems to meet performance and security requirements.

Thank you for your help in this matter. If there are any questions concerning this matter, please contact the undersigned.

Respectfully,

Brett Kilbourne

Cc: FCC Participants

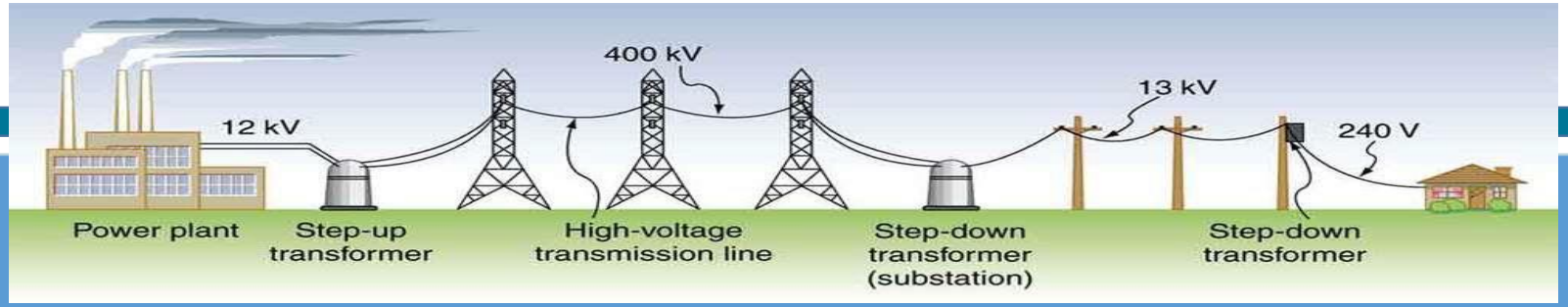


Potential Interference to Utility and CII 6 GHz Systems from Unlicensed Operations

June 26, 2019

Utility Grid Operations

- Electric utilities operate three functional systems
  - Generation
  - Transmission – 69KV-765KV
  - Distribution – 120/240V (customer) – 4KV-46KV (feeders)
- The power within the grid must constantly be maintained in balance, i.e. generation=consumption
- A complex telecommunications ecosystem enables monitoring and controlling power equilibrium within the grid



Utility Telecommunications

- Utilities maintain a highly reliable and available telecommunications network to manage the grid
  - Utilities require pervasive network coverage across their service territory
  - Backbone transport services are typically a combination of fiber optics and point-to-point microwave systems
    - Backbone systems aggregate traffic and services across the grid – creates a large telecom fault domain if interrupted
    - Fiber – very expensive ~$100k per mile
    - Pt-to-Pt microwave ~$50-$100k per path
    - Path distance can be up to 40+ miles, avg 20 miles
    - Utilities may have 100's of microwave hops, ranging from 20%-80% of backbone mileage for a given utility
    - Microwave is used in urban, suburban, and rural areas

Critical Utility Applications

- Among the many applications within the utility portfolio, two critical applications stand out that are required to ensure grid stability and reliability
  - Teleprotection – monitoring the health of transmission lines between substations
    - Require millisecond response time to clear faults
    - Five 9's of availability
    - Failure to function would result in significant equipment damage, i.e. substation transformer fires or worse
  - SCADA Telemetry – monitoring power flow across the grid
    - Requires real-time reporting of critical power related parameters from grid infrastructure across the territory
    - Enables control of transmission & distribution switchgear to maintain grid equilibrium

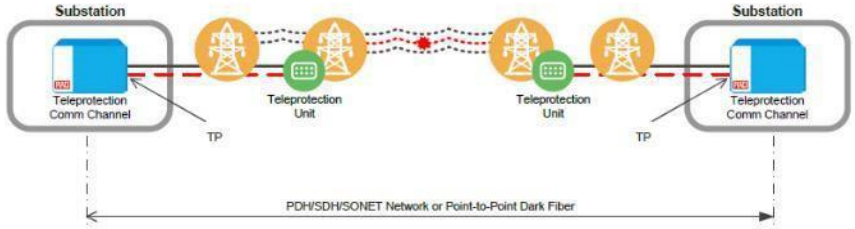


Figure 1. Teleprotection Connectivity with Ultra-Low End-to-End Delay

Microwave Design Considerations

- Microwave paths are an integral component of utility network backbone
  - Paths exist as single spurs or built in a protected ring configuration
  - Path design is a complex calculation to ensure worst case fade budget
  - Rule of thumb path budget is 40db
- Many factors contribute to link budget based on clear line-of-sight including Fresnel Zone
  - Free space path loss – function of distance
  - Rain/Snow fade
  - Atmospheric absorption
  - Line-of-sight obstacles – terrain
  - Foliage clutter
  - Multipath fade – ground reflection
- Introduction of yet another interference factor may render the link unavailable under certain circumstances
  - Increase in noise floor caused by external interference could consume available fade budget
  - Digital microwave system are either on or off, no reduction in capacity if fade margin is depleted (unlike analog)
  - Near impossible to track down the interfering device

Loss of Signal Impact

- In the event of signal loss
  - Network traffic stops
  - Operations personnel lose visibility and control functions for portions of the grid being serviced by the affected path
  - Transmission lines may have to be removed from service if no backup communications are available
  - In the event a backup path exists, network routing must re-converge to align to backup path – up to two minutes of outage time
  - If signal is restored during this time the radios will synchronize and network routing must again re-converge – up to two more minutes
  - Oscillating interference, could render the network down hard

- Utilities and other critical infrastructure industries (CII) rely on the 6 GHz band for a variety of mission critical communications.
- The 6 GHz band is uniquely suited to support utility and CII communications needs and there is a lack of reasonable alternatives.
- Many utilities and CII relocated microwave systems to the 6 GHz band after the 2 GHz band was reallocated.

- Utilities and CII require ultra-high reliability and exceptionally low latency for these communications systems.
- Potential interference from unlicensed operations must be prevented from occurring.
- Remedying interference after the fact will not be sufficient.
- The probability of interference and the magnitude of the risk is unacceptably high

- Concerns:
  - Interference from outdoor operations
    - AFC is untested and lacks transparency to allow utilities and CII to mitigate and resolve interference that occurs.
    - AFC is predicated on modelling that may not account for real-world environment or actual microwave operations.
  - Interference from indoor operations
    - Overestimated attenuation
    - Uncontrolled operations
    - Unknown locations
    - Improper installation
    - Nothing prevents devices from being taken outdoors

- Remaining issues:
  - Enforcement mechanisms in the event of interference
  - Security concerns about AFC
  - Inaccuracies in underlying data
  - Centralized or decentralized AFC
  - Performance requirements for AFC
  - Independent testing and certification of AFC
  - Adjacent channel interference
  - Incremental deployment of unlicensed systems to limit the potential for interference

Discussion