

Periodic Noise

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This work explores the phenomenon of periodicity (usually at 24-hour periods) in the received signal level observed in Commercial Microwave Links. We will present an overview based on several observations from different locations around the world (mainly in Germany, Israel, Sweden, and Italy) and from different sources (cellular backhaul commercial microwave links and smart-city wireless network of mm-wave links) which are collecting data with different characteristics (e.g. sampling methods like instantaneous and min/max samples at different sampling rates, using different quantization levels). We will share insights on how atmospheric factors (e.g., weather) as well as hardware characteristics might play a role in these signal fluctuations, relating to previously reported studies.

Preliminary results suggest that fluctuations during the daily cycle can reach a few decibels at a number of locations, regardless of whether or not precipitation is present.

Despite the obvious correlation with a number of daily phenomena such as temperature, air pressure, and absolute humidity, the exact causes are still not fully understood, as correlation does not mean causation.

We will present key observations and show that, while a daily cycle in atmospheric conditions seems to match the pattern of signal loss, there is not yet a definitive cause-and-effect pattern for why this happens. Understanding this phenomenon is important both from an opportunistic sensing point of view and from a practical point of view. On the opportunistic sensing side, a better understanding of how atmospheric changes affect wireless signals could help fill in the gaps in current theories and allow for more accurate opportunistic weather sensing. In practice, better insight into these effects could help communication service providers design more reliable networks.

Are you an Early Career Scientist ?

Yes

Author: ALON, Sagi

Presenter: ALON, Sagi

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