EXHIBIT — INTERFERENCE ANALYSIS

Supporting FCC Form 442

Applicant	KMB Telematics Inc.
FRN	0030628945
Equipment	KMB Traverse 60™, P/N SX35K
Requested band	24.05–24.25 GHz, 60 MHz occupied
Date	August 6, 2026

1. Summary and Status of the Analysis

This exhibit analyzes the interference potential of the operations proposed in Applicant's narrative statement and identifies the transmit filtering required to render that potential acceptable. The analysis addresses in order of significance: unwanted emission into the adjacent 23.6–24.0 GHz passive band, harmonic and spurious emission, the adjacent 24.25–24.45 GHz band, co-channel Federal radiolocation, and terrestrial receivers generally.

The controlling constraint is unwanted emission into the passive band. The analysis concludes that a total suppression of approximately 35 dB relative to the unfiltered emission is required in 23.6–24.0 GHz, that this suppression is achievable by filtering ahead of the power amplifier, and that the power amplifier's own noise contribution is approximately 18 dB below the applicable criterion without further treatment.

Status of the underlying data. Applicant does not yet possess the transmit hardware. The emission characterization in Section 3 is therefore predicted from component-level data and design values. Two inputs are provisional and are the principal sources of uncertainty: the synthesizer phase noise floor at large frequency offsets, which is at this stage a prediction obtained by circuit simulation rather than a measurement; and the power amplifier noise figure at the intended operating point. Both are addressed by sensitivity analysis in Section 4.6. Applicant will verify the emission spectrum by measurement before commencing full-power operation, as set out in Section 10 and in Phase 1 of the program of experimentation.

2. Parameters

Parameter	Value
Transmitter power at antenna port	100 W (20.0 dBW)
Antenna gain	31 dBi at 24.2 GHz
EIRP	51.0 dBW (81 dBm)
Antenna	Directional, 31 dBi. Type, beamwidths, and pattern data in the Confidential Technical Annex
Center frequency	24.20 GHz preferred

Parameter	Value
Occupied bandwidth	60 MHz (24.17–24.23 GHz)
Emission designator	60M0F3N
Modulation	Linear sawtooth FMCW; timing in the Confidential Technical Annex
Duty cycle	Continuous
Maximum elevation angle	45°
Number of units	1
Transmit chain characteristics	Synthesizer phase noise, amplifier gain, noise figure, harmonic and spurious content: see Confidential Technical Annex

3. Emission Characterization

3.1 In-band emission

The transmitted emission is a linear frequency-modulated continuous-wave chirp of 60 MHz excursion with a linear retrace. The instantaneous frequency remains within the occupied band throughout the sweep, including the retrace interval, and phase is continuous across chirp boundaries. The waveform is accordingly constant-envelope. Timing values appear in the Confidential Technical Annex.

3.2 Synthesizer phase noise pedestal

The frequency offsets separating the occupied emission from the passive band are 200 MHz to the upper edge of that band and 600 MHz to its lower edge. At those offsets the synthesizer output is characterized by its broadband phase noise floor rather than by close-in noise. The provisional floor value, and the emission levels computed from it, appear in the Confidential Technical Annex. The pedestal is the dominant unwanted emission mechanism by a wide margin, exceeding the applicable criterion by approximately 35 dB before filtering.

3.3 Power amplifier noise contribution

Once the synthesizer pedestal is attenuated below thermal at the amplifier input, the emission in the passive band is set by the amplifier's own output noise, given by $kT + NF + G$. At the gain and noise figure stated in the Confidential Technical Annex, this contribution falls below the applicable criterion by not less than 14 dB across the plausible noise figure range. It cannot be reduced by filtering ahead of the amplifier and is treated in Section 4.5.

3.4 Spectral regrowth

The amplifier is operated in compression. Spectral regrowth arising from amplitude-to-amplitude distortion acts on envelope variation, and the transmitted waveform is constant-envelope. The two-tone third-order intermodulation figure characteristic of the device is therefore not predictive of the emission spectrum under the operational waveform. Residual amplitude-to-phase conversion acting on the small

envelope variation at the chirp corners is a near-in mechanism and is not expected to contribute materially at offsets of 200 MHz or greater. This expectation will be tested by measurement in Phase 1.

3.5 Harmonic emission

Harmonic content at full output places the second harmonic near 48.4 GHz and the third near 72.6 GHz, neither within or near the passive band. Harmonic levels appear in the Confidential Technical Annex. These emissions are addressed against the general spurious limit in Section 7.

3.6 Discrete spurious emission

Spurious content is characterized at the level stated in the Confidential Technical Annex. The frequencies at which those products fall have not yet been established by measurement. Because the transmit chain is driven by a single chirp rather than by multiple carriers, amplifier nonlinearity generates harmonic products rather than products offset several hundred megahertz below the carrier. Discrete products falling within the passive band would therefore be expected to originate in the synthesizer (reference feedthrough or fractional-N artifacts) and to be attenuated by the same filtering that addresses the phase noise pedestal. Section 4.6 quantifies the consequence should such a product nonetheless appear in band.

4. Adjacent Passive Band: 23.6–24.0 GHz

4.1 Allocation status and applicable criterion

The band 23.6–24.0 GHz is allocated to the Earth exploration-satellite (passive), radio astronomy, and space research (passive) services, and is subject to footnote 5.340, under which all emissions are prohibited. Applicant does not request and will not operate on any frequency within that band. The question addressed here is the level of unwanted emission falling into it.

No Commission rule prescribes a numerical unwanted-emission limit into this band for stations in the Experimental Radio Service. Applicant has therefore adopted as a design criterion the protection level specified in Recommendation ITU-R RS.2017 for Earth exploration-satellite (passive) sensors in 23.6–24.0 GHz, namely −166 dBW in a 200 MHz reference bandwidth at the sensor input. That level is expressed on an aggregate basis across all interfering sources and is associated with a permissible percentage of affected measurements over a large reference area. Applicant addresses the aggregate character of the criterion in Section 4.7 but designs to the full level as though its emission were the sole contributor.

Applicant additionally adopts, and commits to meet, a transmitter-referenced limit: unwanted emission power, expressed as total radiated power, not exceeding −39 dBW in any 200 MHz of the 23.6–24.0 GHz band. That figure is the limit adopted at WRC-19 (Resolution 750) for the protection of this passive band from IMT base stations in adjacent spectrum, in its more stringent post-2027 form, and the Commission has imposed it as a condition on recent experimental authorizations in the 24.05–24.25 GHz band.[1]

[1] MatrixSpace Inc., Experimental Radio Station Construction Permit and License, Call Sign WM2XOM, File No. 0427-EX-CN-2022 (eff. May 13, 2022), Special Condition (6) (requiring that “the unwanted emissions power does not exceed −39 dBW in any 200

Applicant states the limit as total radiated power, consistent with its WRC-19 formulation. Both criteria are applied in Section 4.4, and the required suppression is set by whichever binds more tightly.

4.2 Reference geometry

The worst case for coupling into a spaceborne passive sensor arises at the upper limit of the requested elevation sector. The following geometry is adopted:

Quantity	Value
Transmit elevation angle	45° (upper limit of requested sector)
Sensor altitude	800 km (representative sun-synchronous orbit)
Slant range	1,074 km
Free-space path loss at 23.8 GHz	180.6 dB
Sensor antenna gain	30.5 dBi (ATMS-class 23.8 GHz channel, 5.2° beam)
Sensor pointing	Main beam directed at the transmitter (worst case)

The sensor is assumed to be illuminated by the transmitter main beam and to have its own main beam directed at the transmitter simultaneously. Both assumptions are conservative.

4.3 Unfiltered emission at the sensor

The computed levels of each contributor at the sensor, and their relation to the criterion, are tabulated in Section 6 of the Confidential Technical Annex. In summary: the synthesizer pedestal exceeds the criterion by approximately 35 dB and is the controlling contributor. The amplifier's own output noise is below the criterion by not less than 14 dB across the plausible noise figure range, and a discrete spurious product at the characterized level, were one to fall within the passive band, would exceed the criterion by approximately 12 dB and is addressed by the same filtering as the pedestal.

4.4 Required suppression

Against the sensor-referenced criterion, the synthesizer pedestal exceeds the permitted level by approximately 35 dB and is the controlling contributor. Against the transmitter-referenced limit of −39 dBW total radiated power in 200 MHz, the unfiltered pedestal requires 27 dB of suppression, and the amplifier's own output noise complies with margin exceeding 20 dB without any treatment. Applicant commits to attenuation of not less than 35 dB across 23.6–24.0 GHz — the level at which both criteria above are satisfied — and will procure filtering specified above that minimum in order to preserve engineering margin against realization tolerances and temperature variation. The procurement specification appears in the Confidential Technical Annex. The committed minimum, together with the two absolute emission limits stated in Section 4.1, are the figures of record.

MHz of the 23.6–24.0 GHz Earth Exploration-Satellite (passive) band"). See also Resolution 750 (Rev. WRC-19).

4.5 Treatment within the transmit chain

The required attenuation is applied within the transmit chain ahead of the final amplification, so that the synthesizer pedestal is suppressed before it is amplified rather than after. Once the pedestal is reduced below thermal at the amplifier input, the residual emission in the passive band is determined by the amplifier's own output noise, which Section 4.3 shows to be below both applicable criteria with margin of not less than 14 dB; no further treatment of that contribution is required. Emissions generated within the amplifier itself, principally harmonics, are addressed by additional filtering downstream, as described in Section 7. The filter configuration and component specifications are set out in the Confidential Technical Annex.

4.6 Sensitivity to the provisional inputs

Two inputs are provisional. Their effect on the required filter attenuation is as follows:

Synthesizer phase noise floor. The floor value stated in the annex is a design prediction obtained by circuit simulation of the synthesizer chain. Simulated phase noise at large offsets depends on the device noise models employed and can err in either direction: contributors present only in hardware, such as buffer and multiplier additive noise, are not always captured. If the measured floor is lower than predicted, the exceedance and the required attenuation fall correspondingly. If it is higher, they rise, in which case the procurement margin above the committed minimum absorbs the difference up to approximately 10 dB, and beyond that additional attenuation would be installed. In all cases the absolute emission limits of Section 4.1 remain the binding commitments, and the verification gate of Section 10 precludes full-power operation until measurement confirms them. Applicant will establish the true floor by measurement, using a method capable of distinguishing the source floor from that of the measuring instrument, and will specify the filter to the value so established, maintaining in any event not less than the 35 dB minimum committed in Section 4.4.

Amplifier noise figure. The conclusion in Section 4.5 is insensitive to this input across the plausible range, the amplifier contribution remaining below the criterion by not less than 14 dB at the pessimistic end of that range. Applicant will measure the noise figure at the intended operating point and will reassess should it exceed the range assumed in the annex.

Discrete spurious products. A single product at the characterized level falling within the passive band would exceed the criterion by approximately 12 dB. The 45 dB of filter attenuation specified in Section 4.4 is sufficient to bring such a product below the criterion with margin. Applicant will identify the frequencies of spurious products by measurement in Phase 1.

4.7 Aggregate character of the criterion

The criterion adopted in Section 4.1 is expressed on an aggregate basis across all interfering sources and is associated with a permissible percentage of affected sensor measurements over a large reference area. Applicant's operation is a single transmitter with a beamwidth of approximately 5°, operating from one location at a time, and directing its main beam above the horizon only during those portions of the program requiring elevated pointing. The proportion of any passive sensor's measurements capable of being affected is correspondingly small. Applicant notes this consideration but does not rely upon it: the

filtering specified in Section 4.4 is dimensioned to meet the criterion as though Applicant's emission were the sole contributor and the sensor were continuously illuminated.

5. Adjacent Bands Above 24.25 GHz

5.1 24.25–24.45 GHz — Upper Microwave Flexible Use

The band immediately above the requested allocation is licensed for upper microwave flexible use. At the preferred center frequency of 24.20 GHz the occupied emission extends to 24.23 GHz, leaving 20 MHz to the band edge. Transmit filtering provides limited attenuation across so small a separation, and Applicant does not rely upon it in this section.

Protection of receivers in that band rests instead on three factors: First, licensed operations in 24.25–24.45 GHz are terrestrial, and at an antenna centerline of 2–3 m Applicant's radio horizon is approximately 6.5 km against a ground-level receiver and approximately 20 km against a receiver at 10 m height. Interference potential is accordingly bounded by path geometry. Second, the transmit beamwidth is approximately 5°, so the emission occupies a single narrow sector at any instant. Whether pointing is held fixed for a measurement session or slewed across a series of sectors, the sectors to be illuminated are established in advance by the test geometry, so the pre-operation survey described next covers every azimuth to be used before transmission begins; and where the beam is slewed, any given direction is illuminated only transiently. Third, Applicant will conduct a passive spectrum survey at each site before transmitting and will select a center frequency, or decline to operate, accordingly. Should the site survey identify operations in the adjacent band in the vicinity, Applicant will move its center frequency downward within the authorized range, increasing the separation.

5.2 24.45–24.65 GHz — Radionavigation

The band 24.45–24.65 GHz is allocated to the radionavigation service on a primary basis for Federal and non-Federal use, together with inter-satellite links, and hosts operating ground-based systems, including systems authorized by waiver and by experimental license. Because radionavigation is a safety service, Applicant addresses it notwithstanding the separation involved. The lower edge of that band lies not less than 220 MHz above the upper edge of Applicant's occupied emission — eleven times the separation to the UMFUS band edge — and at that offset, unlike the near-adjacency addressed in Section 5.1, both the transmit filtering and the emission's own spectral rolloff provide substantial suppression. The horizon, narrow-sector pointing, and pre-operation survey factors described above apply equally; the Phase 1 spectrum survey spans 23.6–24.65 GHz and therefore encompasses this band in full, and Applicant will not operate where the survey identifies radionavigation activity that the proposed operation could disturb.

6. Co-channel: Federal Radiolocation

The band 24.05–24.25 GHz is allocated to the radiolocation service on a primary basis for Federal use and on a secondary basis for non-Federal use, footnote US110 providing that the non-Federal

radiolocation service is secondary to the Government radiolocation service. Applicant's operation is a secondary non-Federal radiolocation use.

Applicant has not attempted a quantitative co-channel analysis. The assignment data necessary to perform one is held by the National Telecommunications and Information Administration and is not available to Applicant. An analysis constructed from assumed parameters would not assist the Commission. Applicant instead relies on the following, and will comply with any condition arising from coordination:

- Secondary status is accepted without qualification: Applicant will not cause harmful interference to Federal radiolocation and will accept interference from it.
- A passive spectrum survey precedes transmission at every deployment, and a center frequency clear of detected activity is selected; where activity cannot be avoided by frequency selection, Applicant will not operate.
- The preferred center frequency of 24.20 GHz is selected in part to avoid 24.150 GHz, a frequency designated for Federal radiolocation device use.
- The transmit beamwidth is approximately 5°, limiting the solid angle illuminated at any moment.
- A designated point of contact with authority to terminate transmissions is available at all times during operation, consistent with 47 C.F.R. § 5.107.

7. Harmonic and Spurious Emission

The general limit applicable to spurious emission is $43 + 10 \log P$ dB below the unmodulated carrier, which at 100 W corresponds to 63 dB. Harmonic content at full output is characterized in the Confidential Technical Annex at a level requiring further attenuation. Applicant will install transmit filtering specified to provide not less than 45 dB of attenuation from 45 GHz to 100 GHz, covering both the second harmonic at 48.4 GHz and the third at 72.6 GHz. The configuration is set out in the Confidential Technical Annex. Applicant will verify the absence of spurious passbands by measurement across the range specified in 47 C.F.R. § 2.1057 before commencing full-power operation.

8. Terrestrial Receivers Generally

At an antenna centerline of 2–3 m the radio horizon is approximately 6.5 km against a ground-level receiver and approximately 20 km against a receiver at 10 m height. During operation at or near 0° elevation, which comprises the calibration and clutter-characterization portions of the program, interference potential toward terrestrial receivers is accordingly bounded by path geometry rather than by radiated power, and that operation is additionally conducted at reduced power. During operation at elevated angles the main beam clears terrestrial receivers entirely at all but the shortest ranges.

Analysis of Commission monitoring facilities under 47 C.F.R. § 5.85(f) is set out in the narrative statement and is not repeated here.

9. Transmit Filtering

The commitments of record are those stated in Sections 4.4 and 7: attenuation of not less than 35 dB across 23.6–24.0 GHz; unwanted emission power in that band not exceeding −39 dBW, expressed as total radiated power, in any 200 MHz; conformance with the sensor-referenced criterion of Section 4.1; and attenuation of not less than 45 dB across 45–100 GHz, free of spurious passbands. The filter configuration and component specifications implementing these commitments are set out in the Confidential Technical Annex, and filter performance will be verified on the delivered units by measurement, per Section 10.

10. Verification Before Full-Power Operation

Applicant will not commence full-power operation until the following measurements have been performed and their results found consistent with this analysis. These measurements constitute Phase 1 of the program of experimentation described in the narrative statement.

- Synthesizer phase noise measured to at least 600 MHz offset, by a method capable of distinguishing the source floor from the instrument floor.
- Power amplifier noise figure at the intended operating point.
- Transmit spectrum measured across the range specified in 47 C.F.R. § 2.1057, at reduced power and into a load or absorber where practicable, establishing the power spectral density within 23.6–24.0 GHz, the frequencies and levels of discrete spurious products, and harmonic levels.
- Filter insertion loss and stopband attenuation measured on the delivered units rather than taken from design data.
- Transmit antenna pattern measured to confirm the sidelobe levels relied upon in the narrative statement.
- Passive spectrum survey of the site prior to any transmission.

Should any measurement indicate that the emission in 23.6–24.0 GHz exceeds the criterion adopted in Section 4.1, Applicant will not operate at full power until additional attenuation has been installed and verified.

Applicant certifies that the foregoing analysis is accurate to the best of its knowledge and belief, and that the values identified herein as predicted are engineering estimates rather than measurements.