CSA.10 Cellular Antenna Feasibility Study





Service name:

CSA.10 Cellular Antenna Feasibility Study

Deliverables

Report and Interactive Technical Support

Duration:

3 Weeks

Service Delivery Objectives:

- A. Test and/or simulate diff erent antenna technologies, topologies, and material
- B. Antennas will be tested in diff erent locations/positions
- C. Selection of the best solution will be based on overall performance and project targets (price, certification, performance etc)



What is the problem or concern we are addressing?

You have a product that needs cellular or LTE, but don't know what kind of antenna, where to put an antenna, or if an antenna is even feasible. Let us figure it out for you.

What are we going to do?

Taoglas will review your product details with you to understand your design priorities. Reviewing your files typically takes a day. Once the files are reviewed, we'll need to meet with your engineering team and project manager to sort out the rest of the details. We'll help you define clear performance requirements for the cellular antennas in your system. For some radios, performance is the main driving factor in order to meet performance or certification requirements. For other radios, performance expectations are not high and factors like cost and size are the drivers.

Examples of performance requirements include:

- Antenna efficiency per cellular frequency band to meet carrier/network
 operator requirements.
- RF isolation required between antennas of different radios to maintain functionality.

Once the design priorities and requirements are set forth, we'll take a prototype of your device into our lab, integrate the chosen antennas, and test the performance of the antenna in situ. We'll repeat the integration and testing, as required, in different locations and with different antennas. Alternatively, we may choose to use electromagnetic simulation to estimate performance of a custom or off-the shelf antenna integrated into your device. Both simulation and testing may be used, depending on requirements and difficulty in integration and testing.

After testing or simulation is complete, a report will be compiled detailing the results, integration details such as matching networks, antenna position, antenna mounting, or cable routing, and recommendations.

Taoglas engineering, in consultation with the customer on the final report, will determine if the measured performance factors are sufficient for the product to meet its performance and certification requirements. Taoglas will be available for further questions on the antenna integration as needed until the initial design files are done.

Because of the wide variety of devices, use cases, and markets, Taoglas cannot advise on every aspect of design or development.

In particular, this service does not cover the following:

- Review of electrical schematics.
- PCB stack-up details.
- RF filtering requirements.
- Emissions or issue mitigation details.
- Detailed electrical, RF, or antenna design.

What do we need?

This depends on where you are in the design. You may only have mechanical concept files at this point, either as industrial design drawings or 3D solid models. We need these documents to understand your desired project direction and to interactively work with you on various options.

If prototypes are available, we will need 2 copies of your device including all the bits and pieces. The units do not need to be fully functional (i.e. firmware/ software need not be complete), but they need to be built up representative mechanical samples.

We will need things like any battery, LCD display, peripherals, cables, etc. all mounted in some sort of enclosure that's at least close to what the final enclosure will be like. SLA or FDM proto enclosures are sufficient but the final plastic material can yield slight differences in performance

In all cases, 3D PDF or eDrawing files for your mechanical assembly. We really do need the ability to hide parts, do cross sections, and make measurements, so an eDrawing with these features turned on is highly recommended. Even though Taoglas will perform hands-on integration as part of this service, these design files are necessary to help us understand the product, make measurements, and, where called for, integration into simulations.

If simulations are required, a STEP or Solidworks file is preferred, though other formats are possible. Consult with Taoglas Engineering for more details. If you do have schematic, BOM, and layout files done, having these will help us understand your product implementation path. This will again help us better define the best antenna options and limit our implementation recommendations to what works with what you have so far.

PDF format copies of your schematics for each board in the design. If you happen to use Altium then native Altium files would also be helpful. We will NOT review the schematics, but the schematics will assist Taoglas to better understand the product.

PDFs of your PCB layout for each board, all layers. Again if you use Altium, then native Altium files would also be helpful. Please include a document defining the PCB stackup, layer thicknesses, materials, and finishes for the PCB.

Then what?

This effort is typically interactive, either a web meeting or an inperson meeting works best.

After this meeting, Taoglas will provide an email of our understanding of the specifics and our recommendations. From this email your engineering team will have a direction for the antenna selections as well as an integration plan for each antenna in your product.

Taoglas assumes your engineering team will then develop design files to implement the entire product. After the initial product design, Taoglas engineering will review the antenna layout to verify proper implementation. Taoglas offers a number of services, one of which would be review of those initial design files to optimize the radio performance and certification likelihood of your design.

These include:

- ISA.20, ISA.21: In-depth design review, including schematics, PCB layout, and mechanical integration can be implemented prior to prototype fabrication or following test failures.
- ISA.12: transmission line design and review.
- CSA.20, ISM.10, ISA.50, or GSA.10: antenna matching and passive testing.

Visit **www.taoglas.com/solutions/design/** or contact Taoglas sales for further information.

Deliverables

The email from the review meetings will include:

A performance goal for each antenna in the system in terms of radiation pattern, directivity, efficiency, electrical interface, cost and assembly or attachment method. The recommended antenna solution for each radio in the system by part number. A specific integration plan for each antenna in your product. Following the antenna layout review, an email will be sent with recommendations and required changes.



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