



Outcomes and Deliverables

- Review of full set of array simulations.
- Beamformer RFIC selection.
- Multi-layer PCB design.
- Prototyping and Testing.
- Beam steering algorithm developed (optional).
- Report, Interactive Technical Support, and Detailed Array Design.

Duration

1-5 months (this is a typical estimated duration – actual duration on quote may differ)

What We Need

- Array sub-system requirements.

What is the problem or concern we are addressing?

With the advent of 5G applications and system requirements, there is a need for the specification, design, and development of 2D Hybrid array sub-systems for use in high data rate millimetre-wave communication systems. This sub-system contains the antenna array, beamformer RFICs, and a multi-layer PCB to support a mix of power, digital, and RF signalling. This configuration, termed a hybrid array, provides the capability to beam steer the array in one or two- dimensions to ensure good communication link performance.

Taoglas can offer services to aid in the specification, design and development of these systems.

The Process

Part 1 – Design

Taoglas will start with a review of the project requirements to determine array sub-system sizing and electrical characteristics.

Taoglas will then perform EM (Electromagnetic) simulations to determine the array element count and transmit power requirements, along with receive gain and sensitivity of the array. In parallel with this simulation phase we will review beamformer RFIC options to find a good fit for the project at hand in terms of RF port count, transmit power, and noise figure of the beamformer module. We will work with you early in the project design phase to ensure that array sub-system size, performance, and cost attributes fit well within the overall project goals.

As the project progresses, a prototype array with beamformer RFICs will be assembled and tested to verify system performance. Taoglas has measurement facilities in-house to carry-out fast and accurate millimetre wave array measurements. We can work with your team to integrate an algorithm or look-up table to control array beam scanning or we can develop the beam steering algorithm as part of the project scope.

A millimetre wave array sub-system design will require input from multiple engineering disciplines, and Taoglas has the experience and expertise to carry the project forward. The Taoglas team will consist of a mix of antenna, RF system, mechanical, and thermal management engineering to bring the various pieces of the design together.

What does Taoglas need?

Obtaining the array sub-system requirements from you will be the starting point for the Taoglas team to launch the array sub-system analysis. Information on the interface to the transceiver to allow for control signal and connector selection will also be needed. Some basic information on

the application such as indoor or outdoor installation, environmental requirements, etc. will be helpful to add to the relevance of the analysis.

If a radome is required, then insight into the environmental aspects targeted for the final product will be needed. Taoglas has years of experience in radome design and environmental testing to bring to the project. If the radome is supplied by you, then we will need CAD files for the enclosure to assist in array integration.

Part 2 – Reporting and Technical Support

An array sub-system being a complex design, we anticipate a series of meetings and an interactive approach with you to verify objectives are met as the design takes shape. Reports containing simulations and measured data on prototypes will be shared and reviewed with your engineering team on a regular basis. We will work with your team each step of the way to make sure the array sub-system design integrates well into the rest of the communication system.

Taoglas engineering, in consultation with the your design team 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 array sub-system integration as needed until the initial design files are completed.

Part 3- Production

At the conclusion of the design, prototype, and test phase Taoglas team is well prepared to take the array sub-system into production. Taoglas will leverage manufacturing and test capabilities to provide high volume production of the array sub-system at high yield rates. Years of experience in multi-layer PCB manufacturing along with radome tooling development and production will be brought to the table to ensure high quality, high volume deliveries into production contracts. To support quality production of the array sub-system, materials, processes, and components are selected from day one of the project engagement to meet requirements and compensate for variations in the manufacturing process.

Visit [Taoglas Website](#) or contact [Taoglas sales](#) for further information.

Please note - devices, systems and equipment falling within the scope of Annex I of the EU Dual Use Regulation 821/2021 are not eligible for this service. For queries, please consult your legal department or contact exportcompliance@taoglas.com.