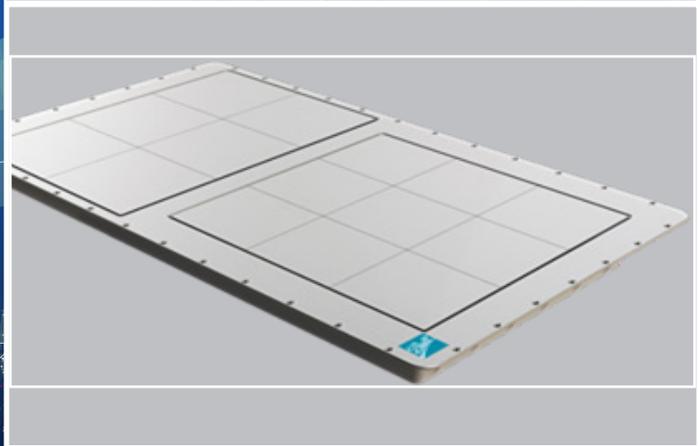
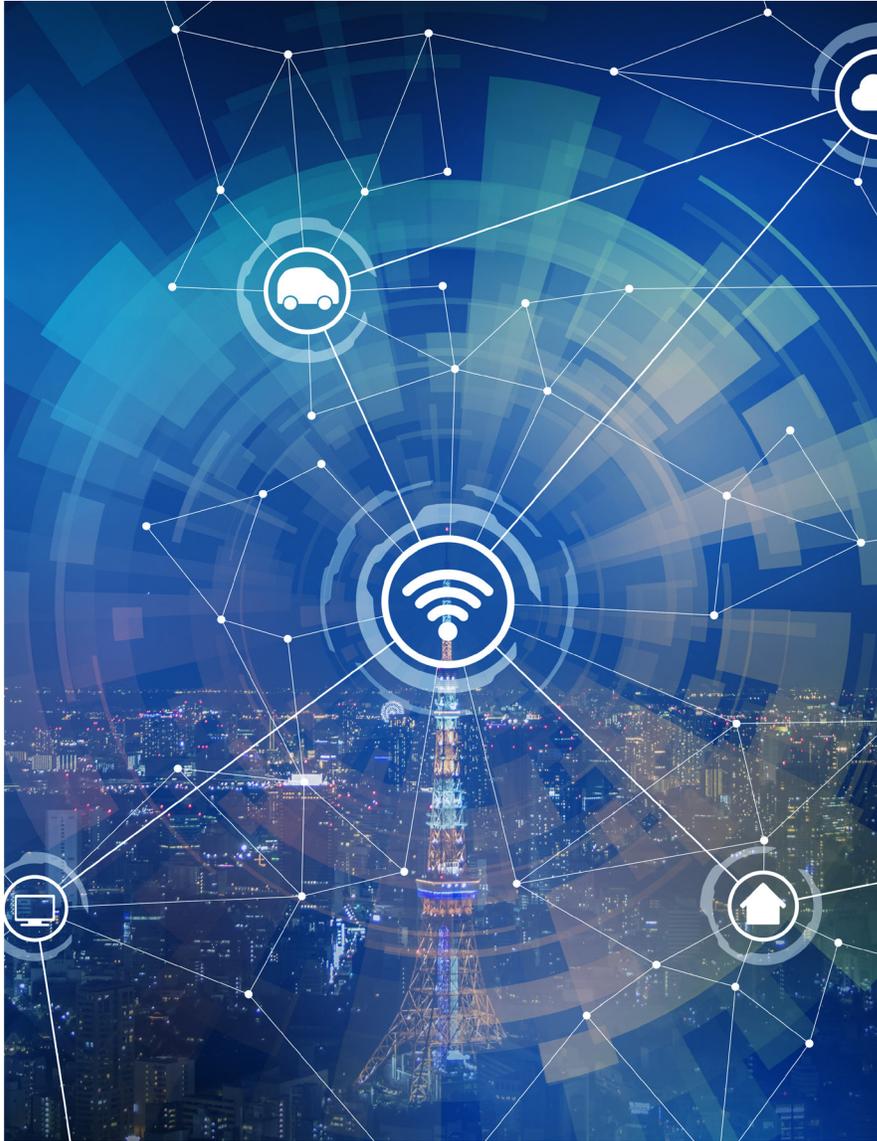


# COMMERCIAL PHASED ARRAYS



GO BEYOND WITH BALL.®

In today's world, an organization's success is directly related to its ability to connect with the people, technologies and markets that it depends on. As the need for data grows and the number of smart devices increases, these connections will need to be faster and more reliable than ever before.

Ball Aerospace's line of commercial, active electronically scanned phased array antennas (AESA) provide reliable, high-capacity, high-speed connections across a variety of platforms, frequencies and applications, enabling a smarter and more connected world.

## GO WITH CONNECTIVITY



Ball is a market leader in affordable phased array antenna systems.

With more than five decades of phased array heritage, Ball is an established market leader in developing low-profile, affordable phased array antenna systems for a variety of frequencies (including L, S, X, Ku, K and Ka-Band) and applications, from aviation and maritime to land and space.

Highly scalable, configurable and modular, planar phased arrays provide flexibility to meet diverse performance, operational frequency, size, weight, power and environmental requirements. Our approach to phased array design combines operational capability with affordability, leveraging commercial off-the-shelf technologies and processes. With a world-class team of engineers and high-capability manufacturing facilities, we will work with you, from design to build and integration to test, to rapidly develop a high-capability system to meet your connectivity demands.



## COMMERCIAL SATCOM

Our SATCOM phased array antenna can be customized to meet any mission or market.

Ball's innovative phased array systems are ideally suited for a full range of global SATCOM services, from in-flight connectivity and high-speed train to maritime and backhaul, to deliver broadband high-data-rate communication. Ball's SATCOM experience covers L-, X-, Ku- and Ka-band spectrums, in-depth knowledge of regulatory standards and an understanding of a diverse range of satellite systems.

Our affordable, smart terminals utilize highly-integrated semiconductor devices, high-volume circuit card assembly processes and automated manufacturing, enabling high volume, consumer and enterprise cost point solutions. Modular and configurable, Ball's commercial SATCOM antenna systems span implementations from fully integrated single housing terminals to distributed systems with externally mounted arrays combined with support components fitted internal to a platform.



## AIRLINK® SATCOM ANTENNAS

Ball offers its line of AIRLINK® antennas, covering L-, X-, Ku- and Ka-band spectrums, for a range of commercial SATCOM use cases, including in-flight connectivity, communication on the move (COTM) and enterprise communication.

Our AIRLINK® Ku and Ka solutions feature our innovative subarray architecture. Designed for optimal flexibility and cost efficiency, subarrays can be tiled together to form an antenna that is customized to meet the users needs. Our planar phased array design delivers low profile, high bandwidth capability to mobile platforms communicating with High Throughput Satellites (HTS) in Geosynchronous Earth Orbit (GEO). The terminal's advanced electronic beam steering eliminates mechanical moving parts, enabling the next generation of Low Earth Orbit/Medium Earth Orbit (LEO/MEO) constellations.

### AIRLINK® Ka

- Ka Antenna optimized for a COTM product



### AIRLINK® Ku

- Ku Antenna optimized for a InFlight connectivity product



## 5G PHASED ARRAY

### Unlocking the potential of the mmWave bands.

Ball is leveraging our Commercial SATCOM technologies and expertise to enable the future of 5G wireless connection. We have developed 5G phased array solutions at 26 Ghz, 28 Ghz and 39 Ghz to improve wireless network efficiency and achieve 5G connectivity goals.

5G systems will deliver substantial improvements in capacity to accommodate rapidly increasing data demands. Data rates on the order of gigabits per second anywhere and anytime can only be achieved with additional spectrum allocations in the mmWave bands. Phased arrays are key

ingredients required to unlock the potential of mmWave wider bandwidths by extending coverage, controlling interference and increasing capacity.

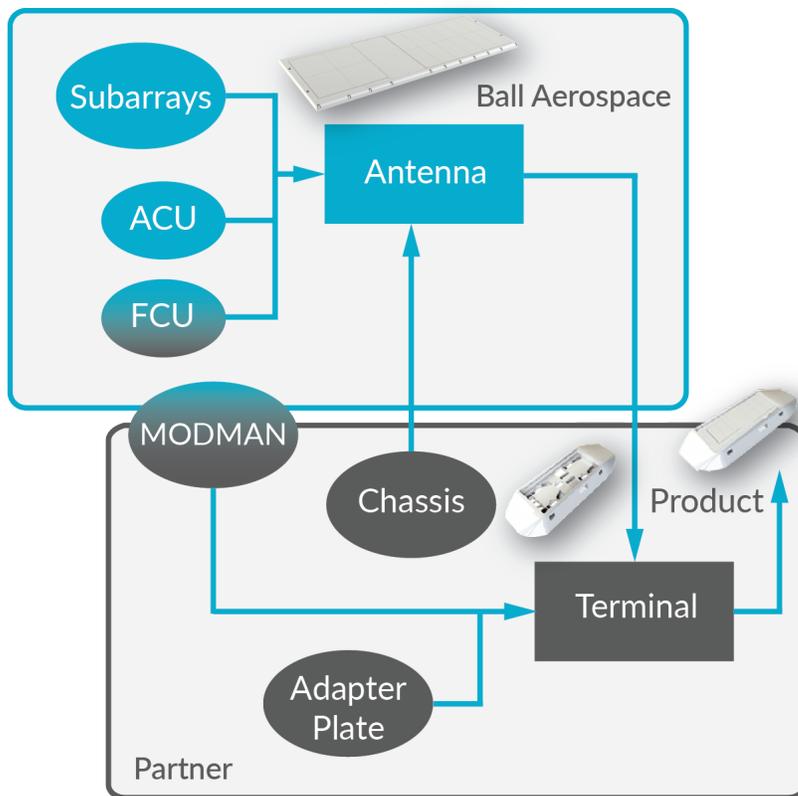
The 5G Rapid Prototype Phased Arrays are a planar phased array that enables rapid prototyping of a mmW 5G system. The antenna provides multiple beam widths to support 5G beam acquisition and channel needs and is half duplex to enable the same antenna to transmit and receive.

# PARTNER WITH BALL

Delivering the next-generation of commercial satellite and cellular communication systems will require strong partnerships across the industry and throughout the supply chain.

With more than 50 years of phased array antenna heritage, Ball offers a discriminating capability to enable new 5G and SATCOM products. Our phased array antenna architecture is optimized for manufacturability, cost and flexibility and, with commercial partners, can be adapted to a broad set of commercial use cases, from in-flight connectivity to mobile broadband services.

The Ball commercial engagement model is flexible and allows for a partnership that capitalizes on each organizations' expertise. We are ready to discuss your flat panel phased array antenna needs and how we can work together.



## BALL PHASED ARRAY ANTENNA ADVANTAGES

**PROVEN. AFFORDABLE. RELIABLE.**

Ball's lightweight, durable, electronically-steerable phased array SATCOM antennas provide numerous benefits:

- **Low profile** – Decreases drag on mobile platforms reducing operating costs
- **Electronically steerable; no moving parts** – Higher reliability and lower maintenance costs; enables SATCOM service for highly mobile platforms
- **Smart, software configured; automated alignment** – Easier to install and configure with lower operational cost
- **Lightweight** – Easy to transport, install and rapidly deploy
- **Fast, agile, accurate steering** – Improves satellite acquisition and tracking
- **Modular** – Enables scalable terminal solutions to meet connectivity demands
- **Distributed amplifiers** – Facilitate reliable connectivity versus mechanical dish single point amplifier failure