



GS1-90R17K GREEN ANTENNA

Pioneering 8T8R Green Architecture for Next-Gen Railway Connectivity

Strategic Overview

As global rail networks transition from legacy GSM-R to **FRMCS (Future Railway Mobile Communication System)** based on 5G standards, communication infrastructure must evolve to meet unprecedented demands for capacity, low latency, and reliability.

Comba's **GS1-90R17K 8T8R Smart Antenna** is specifically engineered for high-speed rail (HSR) environments of 350km/h+. By combining advanced beamforming with a sustainable "Green" architecture, it provides a future-proof foundation for mission-critical rail operations.

The FRMCS Transition: Why 8T8R is Essential

Modern rail services, such as Autonomous Train Operation (ATO) and ETCS evolution, are pushing network requirements to new levels — making 8TR architectures a key enabler for enhanced capacity and consistent performance.



High-Speed Stability

8T8R architecture minimizes signal attenuation and ensure seamless connectivity at **350km/h+**



Precision Beamforming

High-gain directional beams focus RF energy along the tracks, reducing interference and maximizing efficiency



Uplink Empowerment

Supports high-capacity uplink for real-time HD video monitoring and mission-critical railway communications



Case Study: Yangzhou–Gaoyou HSR Deployment

Total Coverage: 7.5 km | Infrastructure: 15 Sites | Configuration: 4TR vs 8TR

Metric (KPI)	4T4R Baseline	8T8R Performance	Total Improvement
Coverage (RSRP)	-86.78 dBm	-82.22 dBm	+4.56 dB Gain
Downlink Rate (Avg)	76.16 Mbps	87.32 Mbps	+14.7%
Downlink (CDF-95%)	28.77 Mbps	52.79 Mbps	+83.4%
Uplink Rate (Avg)	29.12 Mbps	40.19 Mbps	+38.1%
Uplink (CDF-95%)	10.66 Mbps	18.82 Mbps	+76.6%
User RRC (Avg)	20.24	27.3	+34.9%



*Field Data from Yangzhou–Gaoyou HSR Section. 4TR in blue/ 8TR in red



Comba's 8T8R smart architecture empowers operators to realize the full benefits of FRMCS with superior capacity, stability, and future-proof performance.

Core Technology & Benefits

Green Beamforming

- Energy Precision** – RF energy aligned with the rail corridor to reduce power loss and interference
- High Efficiency** – Integrated design minimizes cable loss and enhances overall performance

Optimized Deployment & Lower TCO

- Seamless Upgrades** – Lightweight design enables faster, easier deployment
- Sustainable Design** – Eco-friendly materials supporting low-carbon infrastructure

Why the Comba Green FRMCS Antenna?



✓ SUPERIOR HIGH-SPEED PERFORMANCE

- Optimized for **350km/h+ HSR** in the 1900 MHz band (N101)
- Proven **8T8R beamforming** for reduced interference and enhanced throughput

✓ NEXT-GEN "GREEN" SUSTAINABILITY

- Energy Efficiency** – Precision-focused RF delivery reduces power consumption while maximizing coverage
- Lower TCO** – Lightweight, eco-friendly design enables easier deployment and cost savings

✓ A TRUSTED PARTNER FOR 2026 AND BEYOND

- Seamless evolution from **GSM-R to 5G-R / FRMCS**
- Field-Proven solutions are ensuring long-term network reliability
- Available now, with ongoing NPI development

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