

# Comba

## Business Case - DAS Solution



## THE MAGIC OF THE 2014 SOCCER TOURNAMENT WITH THE BEST VOICE AND DATA INFRASTRUCTURE

Arenas are unquestionably the most impressive elements of the whole structure required to hold large sports events. Design, comfort, accessibility and quality services are critical to great shows and the public's good experience.

The World Soccer Tournament is the most watched sports event in the world, just behind the Olympic Games.

In economic terms, the competition produces positive effects and the legacy left by the event in terms of sports facilities, infrastructure and technology is huge.

Concerning Technology, COMBA Telecom is directly committed to the public's positive experience before, during and after the matches. Robust voice and data solutions provide the best experience and full interaction during events.

## SCENARIO

The best operators in Brazil (**Vivo**, **TIM**, **Claro**, **Oi** and **Nextel**) have got together to overcome the challenge of providing their clients with robust voice data experience in the arenas as the stages of the Confederations Cup 2013 and for the 2014 World Soccer Tournament in Brazil. To talk, disclose contents or interact in social networks, a good radiating system solution is fundamental to any event success.

Due to such big challenge, COMBA Telecom incorporated agility into the first stage of the project to meet, in a very short span of time, the demands generated by the Confederations Cup.

## TECHNOLOGICAL DESIGN

Among other solutions, **DAS** Solution was selected - Distributed Antenna Systema, multi-operator and multi-technology (2G,3G,4G,iDEN), to support voice, data and image demands.

**DAS** - COMBA Solution is a set of active and passive interconnected components forming a data and voice distribution network consisting of:

**BTS Group**: supplied by operators to generate signals and traffic capacity.

**POI-BTS**: combines RF signals from BTS's (POI-BTS) and from MOU's.

**MOU**: converts RF signals, from a POI BTS set, into optical signals.

**OFN**: optical network used to distribute RF optical signals via fiber.

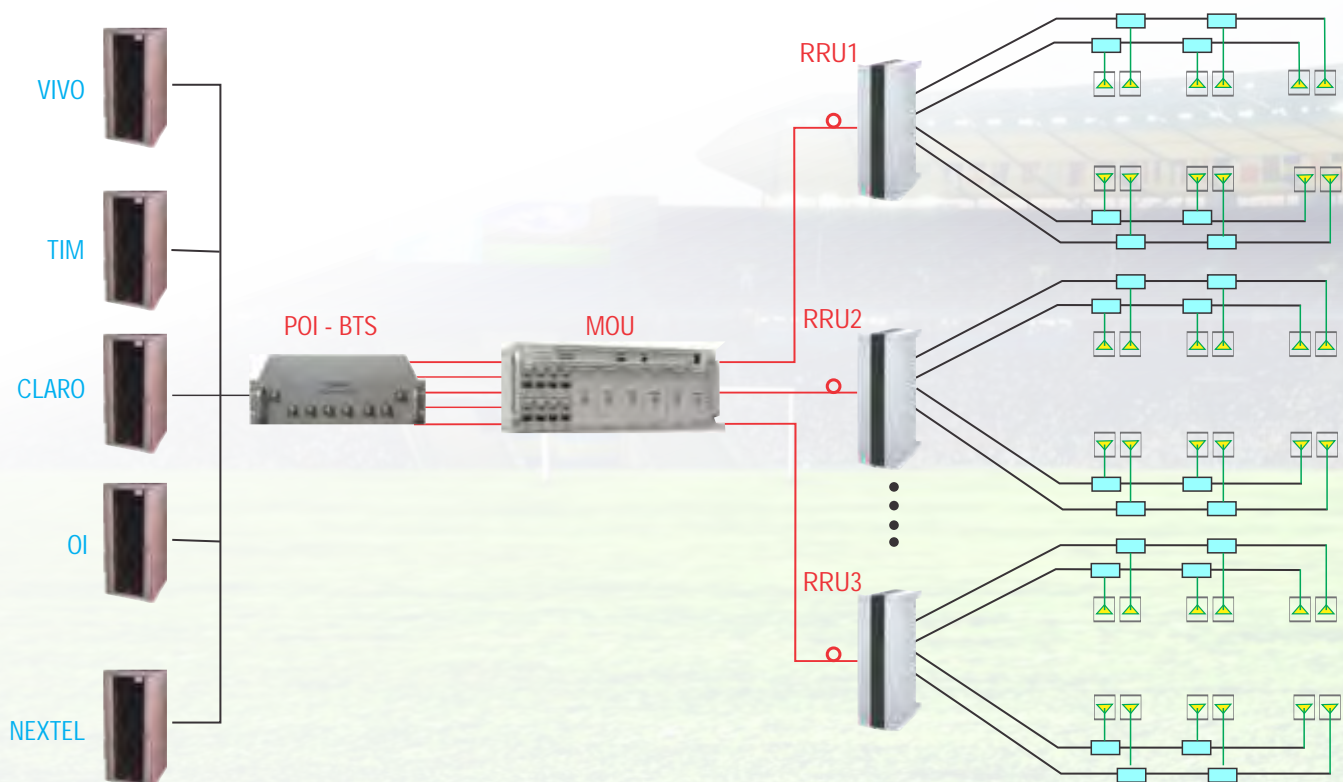
**RRU**: receives optical signals from OFN network and converts them into RF signals and transmitted to the Radiating System.

**SI**: RF cable system, antennas and passive components receiving amplified signals from RRUs and distributing them in the selected areas to provide users with cell coverage.

**SE**: system of power, cables, no-breaks, surge protectors and grounding system.

BTS: Base Transceiver Station  
POI-BTS: Point of Interconnect BTS  
MOU: Master Optical Unit  
OFN: Optical Feeder Network  
RRU: Remote Radio Unit  
SI: Radiating System  
SE: Power System

### DAS SYSTEM GENERAL CHART



The radiating system receives amplified RF signals (from RRUs) and distributes them throughout the stadium. It also ensures the service level, signal quality and coverage for the system users.



Wi-Fi: Brasília Stadium  
and Salvador Arena



## SCOPE AND MANAGEMENT

Operators, upon engaging COMBA Telecom, chose the Full Turnkey service mode. Such mode enable COMBA to deploy and manage distinct stages of a complex project consisting of:



- RF, executive project and construction
- supply of equipment, facilities, commissioning and activation
- electrical and mechanical facilities, alarms and monitoring
- fire fighting and detection, automation and air conditioning

The management of huge and complex projects is part of COMBA Telecom core business, thereby ensuring the delivery of excellent results with high quality.



Castelão Arena Fortaleza - CE

Castelão Arena is among the four largest in Brazil.

- R\$ 518 million investment
- Roofed parking for 1,900 vehicles
- Capacity for 64,000 people



Master Unit



Comba Racks - BTS Hotel



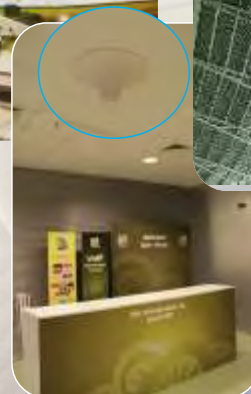
Mané Garrincha Stadium - DF

The arena project was based on the lines used in Eixo Monumental palaces.

- Building with 288 pillars and large external porch
- Capacity for 72.8 thousand people
- R\$ 1.015 billion investment



Outdoor Antenna



Indoor Antenna



### PROJECT FIGURES - 1st STAGE - 4 STADIUMS

Antennas: 1436  
RRU: 130  
BTS: 50 (2G, 3G, 4G)  
MOU: 70

POI-BTS: 39  
RF Cables: 44 km  
Fiber Cabels: 35 km  
Professionals: 210







Fonte Nova Arena - BA

With vertical structure, spectators get closer to the show.

- Capacity for 55.000 people
- R\$ 591.7 million investment
- 90.000 m<sup>2</sup> area



Remote Unit

“We are experts in deploying complex RF projects, we are competitive and provide cutting-edge technology. All these reasons qualified us for the project”

Johnny Brito – Comba Brazil General Director



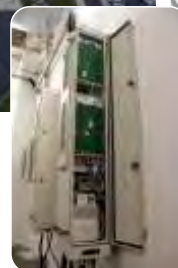
Pernambuco Arena - PE

Multise arena to be used in others competitions, fairs and large shows.

- R\$ 532 million investment
- Capacity for 46.000 people
- 4.700 parking spaces, roofed for 800 of them



Antena Outdoor



Remote Unit



Beijing Olympic Stadium

Stage of the 2008 Olympics opening and closing ceremonies.

The experience consolidated by COMBA Telecom in Beijing was applied to multisystem and multicarrier DAS Solution projects deployed in Brazilian stadiums

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