



## Spanish Smart Venue places IT at center of high-performance sporting achievement

### EXECUTIVE SUMMARY

**Customer Name:** Centre d'Alt Rendiment (CAR)

**Industry:** Sports

**Location:** Catalonia, Spain

**Number of Employees:** 88 staff, 84 coaches, 45 teachers, and 600 athletes and students

#### Challenge

- Improve performance of some of world's best athletes
- Provide new approaches for athletic coaching
- Enable IT as revenue stream, not as a cost center

#### Solution

- Cisco Datacenter Business Advantage solution based on pre-validated FlexPod architecture combining Cisco, NetApp, and VMware technologies
- Cisco wireless network

#### Results

- Transformation in training and coaching of high-performance athletes
- 30 percent saving in power consumption, resulting in reduced cost and carbon footprint
- Tenfold increase in bandwidth, computing power, and storage

### Challenge

Since its creation in 1987 as part of preparations for the Barcelona Olympic Games, the high-performance sports center, Centre d'Alt Rendiment (CAR), has been helping some of the world's best athletes fulfill their potential while pioneering new sports coaching techniques.

CAR was one of the first venues in the world to provide facilities in one location not just for training, but also for related disciplines such as sports science and research, medical treatment, and a complete school onsite for full-time students. Its 215 staff members include coaches, doctors, physiotherapists, and teachers focused on some 400 athletes aged 12 to 18-years (both resident and non-resident), who show sporting promise. The center also accommodates 200 students on coaching education programs.

A founder member of the worldwide Association for Sports Performance Centres, Car is committed to innovation and sharing its experience and expertise with other facilities around the globe. In 2008, government funding to refurbish the venue enabled the center to take sports coaching to a new level.

In a new 25,000 m<sup>2</sup> building costing €36 million are three separate pools (for swimming, water polo, synchronized swimming, and diving) and facilities for a total of 12 sports including artistic gymnastics, taekwondo, wrestling, judo, trampoline, table tennis, and weightlifting.

"We want athletes and coaches to not only benefit from the most advanced sports environment, but also to share best practice and interact with others around the world," says Josep Escoda, the CAR chief technology officer. "The idea is to change the way athletes and coaches train, to truly extend the concept of the freedom of sport."

The challenge was to build the world's first facility to be designed at the outset to support state-of-the-art performance equipment and collaborative training regimes. CAR needed to create a wireless IP-enabled environment able to support unified communications, entry access, climate control, and lighting and ventilation



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Chief Technology Officer  
CAR



systems. It would need the networking, computing, and storage power to support day-to-day operations and pioneering real-time high-definition (HD) video capture and streaming in line with the [EXPERIMEDIA EU project](#), a major EU research project into Future Media Internet (FMI) technologies.

### Solution

“We needed a totally integrated solution that reduced complexity and simplified the management task,” says Escoda. “It had to deliver the bandwidth to run up to 150 high-definition cameras simultaneously, with each camera generating a 700Mbps video stream. And it had to give us the computing power not only for our back office systems, but also for the pioneering video encoding and streaming applications that we will be developing with our international partners.”

After a public tender, CAR decided that a solution based on [Cisco® Unified Data Center Architecture](#) offered a number of advantages.

Cisco Nexus® 7000 Series Switches meet the new building’s high bandwidth demands, along with the lowest possible latency and jitter. The ability to collapse the aggregation layer on to the Nexus platform avoided the cost of intermediate switches. fourteen Cisco Catalyst® 3750-X Series Switches connect to the Nexus at 10Gbps to form the access layer for eighty Cisco Aironet® 1262 Wireless Access Points that provide 802.11n coverage at speeds of more than 150Mbps to every part of the building.

The Cisco Nexus platform also delivers 10Gbps access to an eight-blade Cisco Unified Computing System™ (UCS®) platform for stateless, VMware-based virtualized computing. CAR has taken advantage of the scalability and modularity that UCS offers by running its back office applications, including Cisco Unified Communications Manager and Oracle, on four B-Series 200 Blade Servers. These servers use Intel® Xeon® 2830 Series multicore processors with 96GB of DRAM to provide the optimum balance of performance versus price. Four B-Series 230 Blade Servers with 128GB of DRAM and Intel Xeon 5650 Series multicore processors provide the higher computing power that will be needed for new video-based applications.

The SAN uses pre-validated FlexPod components, with iSCSI connections linking a NetApp 3240 array providing 100TB of disk SATA via the Cisco Nexus 7000 Series Switch.

A second Cisco Nexus 7000 Series Switch has been installed in the old building, with a 10Gbps connection linking the two buildings, helping enable the new facility benefit from existing connections to the Internet and to Spain’s academic and supercomputing networks. A Cisco ASA 5500 Adaptive Security Appliance in the new building complements security features in the old one by providing firewall, intrusion prevention, VPN, and remote access.

The use of software connectors has created a single management console that provides a consolidated, end-to-end view by bringing in management information from Cisco, VMware, and NetApp systems. At its center is the Cisco Prime™ Network Control System (NCS), a first-of-its-kind platform to offer converged wired, wireless, and security policy management.

Cisco Prime LAN Management Solution (LMS) simplifies the configuration, compliance, monitoring, troubleshooting, and administration of the wider Cisco network. Alongside the consolidated console, Cisco Data Center Network Manager oversees the Cisco Nexus core and has SAN and LAN awareness, while Cisco UCS Manager supervises the UCS platform.

**“The new solution gives us ten times the bandwidth, computing power, and storage of the traditional data center in the past. It has also reduced complexity in terms of design, management, and operating costs.”**

Josep Escoda  
Chief Technology Officer  
CAR



## Results

An insight into the power and innovation that the new environment will deliver can be seen in the plans that CAR has for supporting artistic gymnastics, one of the most technically demanding of all Olympic disciplines. Gigabit Ethernet cameras will be used to capture a gymnast’s movements (at a fraction of the cost of the current generation of proprietary HD cameras), which can then be instantly played back for review by the coach and athlete on large display screens in the hall.

At a later stage, the video can be integrated into computerized visualization systems based on the experience and work methods of coaches. These systems are expected to provide essential support to judging panels in international competitions.

In the pool, a new type of starting block will allow the collection and provision of data to swimmers including times, strokes frequency, and lengths completed. Departure impulse force graphs, heart rate monitoring, and video taken both above and under the water will enable technique to be monitored and improved. Specialized audio systems will enable direct interaction with the coach, even with a synchronized swimmer upside down in the water.

“The new network and data center are the foundations for this new environment,” says Escoda, “which will enable us to extend the concept of the freedom of sport by bringing facilities to the athlete rather than the athlete having to visit another part of the building such as the sports laboratory.”

The high-performance WLAN will also support a wide range of mobile devices, from wireless phones to iPads and Cisco Cius™ tablets. The tablets, which deliver HD quality video, are another good example of how the facility will open up new possibilities for real-time collaboration for trackside coaches who, for the first time, will be able to have videoconferences with colleagues anywhere in the world.

Its position at the forefront of sports innovation and technology is underlined by CAR being one of only three Smart Venues within EXPERIMEDIA, a major EU research project into Future Media Internet (FMI) technologies. Within CAR, FMI will combine state-of-the-art networking, sensor infrastructures, service platforms, video analytics, and even 3D capture to improve the performance of professional sportspeople. The Cisco B-Series 230 Blade Servers will provide the necessary computing power for MXF (Material Exchange Format) encapsulation of MPEG video streams, essentially bundling video, audio, and metadata to facilitate the management and retrieval of video content.

“The new solution gives us 10 times the bandwidth, computing power, and storage of the traditional data center in the past,” says Escoda. “It has also reduced complexity in terms of design, management, and operating costs.” The use of UCS has played a major role in reducing the overall energy required for power and cooling by an estimated 30 percent. The elegance of the design means that, despite the increase in capacity and power, Escoda and his two-man IT team will continue to be able to manage day-to-day operations.

The new infrastructure will also play an important role in attracting ongoing revenue to fund operations and future investment. The new facilities are attracting the interest of international sports organizations around the world. Teams from as far afield as Qatar and Japan are already using the new facilities. The ability to carry out In Service Software Upgrades (ISSU) without interrupting services on the Cisco Nexus switch is another welcome feature, particularly as visiting international teams pay to use CAR facilities without any downtime.



The power, scalability, and manageability of the new data center will provide further revenue-generating opportunities. It comprises two aisles, one of six racks and the other of four, and it is estimated that demand can be met for the foreseeable future, enabling spare capacity to be offered to other organizations. The ability to spin up new virtual machines in a matter of minutes rather than weeks, using UCS Service Profiles, is attractive both to CAR and potential new customers. If required in the future, Fibre Channel over Ethernet storage facilities could be easily added, thanks to Unified Fabric on the Nexus.

### Next Steps

With the network and data center in place, CAR is developing the tools, systems, and sensors that will define the next generation of high-performance Smart Venues for sports training. The first phase of the HD Gigabit video project is under way, with cameras and associated local storage connected directly to the Cisco Catalyst 3750X switches. CAR is also drawing up plans to introduce a Virtual Desktop Infrastructure on UCS to extend the life of its desktop computing estate.

### For More Information

For further information on the Cisco architectures and solutions featured within this case study, please go to:

[www.cisco.com/go/datacenter](http://www.cisco.com/go/datacenter)

[www.cisco.com/go/collaboration](http://www.cisco.com/go/collaboration)

[www.cisco.com/go/borderless](http://www.cisco.com/go/borderless)

### Product List

#### Data Center Solutions

- Cisco Unified Computing System (UCS)
  - Cisco UCS B200 M1 Blade Servers
  - Cisco UCS B230 M1 Blade Servers
- Cisco UCS Manager

#### Voice and IP Communications

- Cisco Unified Communications Manager

#### Wireless

- Cisco Aironet 1262 Wireless Access Points

#### Routing and Switching

- Cisco Nexus 1000v Series Switches
- Cisco Catalyst 3750-X Series Switches

#### Network Management

- Cisco Prime Network Control System
- Cisco Prime LAN Management Solution
- Cisco Data Center Network Management

#### Security and VPN

- Cisco ASA 5500 Adaptive Security Appliance

#### Storage

- NetApp



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