



Rock concert at the 21,000 capacity Manchester Arena, courtesy of Karin Albinsson.

# The Extricom High Density Wi-Fi for Large Venues Solution

## Extricom LV-2000

Extricom's Wi-Fi solution for high density large venues provides robust connectivity and high throughput for thousands of wireless clients in convention centers, arenas and open air stadiums.

This is also a perfect enabler for mobile network operators to offload data

traffic from these challenging cellular environments to the venue's Wi-Fi network

Beyond the unmatched capacity, we offer a simple and cost-effective deployment – requiring no complex RF cell planning, and less access points compared to traditional solutions.



## Channel Blanket Architecture

Delivering wireless Internet in densely populated large venues such as arenas and open air stadiums is no easy technological feat, since cellular networks are unable to provide reliable wireless service to thousands of people, all connecting at once. Extricom's dedicated large venues solution resolves the technical obstacles, building on years of expertise delivering Wi-Fi in the most challenging environments.

The Channel Blanket architecture, underlying our solution, is designed to offer high capacity and Wi-Fi performance even in the most challenging environments. As such, it inherently addresses large venue issues such as co-channel interferences, high density of mobile clients, and the problematic placement of access points.

Channel Blanket takes a different approach than traditional microcell topologies, which assign each access point a single Wi-Fi channel and require intensive cell planning to minimize co-channel interference.

With Channel Blanket, no frequency planning or interference mitigation is necessary between access points. Multiple access points are placed on the same channel, creating a blanket of coverage that uses the same channel across the entire venue. Several channel blankets, of non-overlapping channels, created on both 2.4GHz and 5GHz bands, with each channel blanket covering the entire space. The Channel Blanket topology delivers complete coverage with no co-channel interference.

From the client's point of view, multiple channels are available at each location – as opposed to the single channel made available with microcell or 'picocell' type of solutions.

With its complete coverage across the entire venue, Channel Blanket eliminates co-channel interferences and handoff issues. Instead, it delivers a high capacity and stable connection that is resistant to outside interferences and RF signal variations.



Extricom Channel Blanket™ Typical Arena Coverage

## Access Point Placement

With co-channel interference issues eliminated by Channel Blanket, the deployment of access points is a straightforward process. No need for placing access points under concrete seats, or lowering transmission power in order to decrease cell coverage.

Access points can be placed in close proximity to each other - creating shorter distances between end users and access points and providing improved link budgets.

## Directional Antennas

Our high density large venues solution uses high-gain directional antennas, which improve the link budget between access points and mobile clients, providing higher transmission rates and channel availability.

An arena or stadium can be split into a large number of sections using many access points, operating on the same channel, without the risk of RF interference between mobile clients and access points.



## Dedicated WLAN Switch

A central switch, the LV-2000, provides the central management and control of all transmissions and RF interference levels across the site. The switch makes all decisions for packet delivery, while access points funnel client traffic to the switch for processing. Several LV-2000 switches can be deployed in a single site in order to increase system coverage and capacity.

## Wireless Client Noise Mitigation

One of the key challenges of Wi-Fi in large venues is the congested air created by thousands of mobile devices automatically sending data packets in the attempt to detect and connect to the wireless network. Such extreme conditions may prevent any WLAN implementation from serving clients.

Using advanced software algorithms significantly lowers the excessive 'noise' generated by mobile clients during their connection to the network.

## Wi-Fi Offload

Mobile network operators are facing increased challenges when attempting to provide adequate data coverage at high density large venue environments. The thousands or sometimes tens of thousands of devices with their massive data access requirements create an unmanageable situation - in fact, even voice coverage at such venues is something operators are really struggling to cope with.

Extricom's Wi-Fi deployments at high density large venues can serve as the perfect solution for these challenges. Cellular data subscribers can be authenticated and granted access to the venue's Wi-Fi network in a seamless and secure manner. Such offload can be based on the traditional mechanisms or on the more current HotSpot2.0 standard. This way, operators both assure an excellent experience to their subscriber base and are able to manage their costs in terms of potential expansions of their cellular coverage at these challenging environments.

## Wi-Fi Optimization

Wi-Fi capacity, reliability and throughput are further optimized with the following Extricom features:

### Flexible channel assignment.

Each channel can be configured independently of others, which enables applying different security levels to each channel. Alternatively, a specific ESSID can be configured to several channels to provide increased bandwidth for a specific audience group, such as photojournalists or VIP booths.

### Wireless client capacity.

Any number of users in a closed arena or an open stadium can be handled, while accommodating a huge number of wireless client connections. Our specific system layout is based on the unique physical characteristics of each site and the expected number of users.

### Load balancing.

Wireless users can be evenly distributed across multiple LV-2000 switches to provide optimal load balancing.

### 5GHz band steering.

Newer mobile devices that support dual band operation (both 5GHz and 2.4GHz) can be automatically steered to use the less congested 5GHz band, in order to free up bandwidth for smartphones that can only use the 2.4GHz band.

## Who is covered by our Channel Blanket?

Extricom's Wi-Fi solutions are used in the most challenging environments in industries such as education, healthcare, manufacturing, logistics and warehousing, retail and large venues.

Some of our large venue customers include the Houston Rockets, UK's Manchester Evening News (MEN) Arena, the Indiana Pacers, the Sands Expo and Convention Center and the Venetian/Palazzo Casinos/Malls in Las Vegas.

## Providing full WLAN coverage to the 2013 NBA All Star Weekend Games

During the NBA 2013 All Star weekend games, hosted at Houston's 18,023 seats Toyota center, both fans and journalists enjoyed free Wi-Fi .

Journalists were able to stream real-time content and fans could access social media, an NBA All Star App, and a host of other digital platforms. Our underlying Channel Blanket solution provided high-quality reception, uninterrupted coverage and seamless roaming for the duration of the 3-day event. This was one of the world's first events where both 2.4GHz and 5GHz bands provided bandwidth and connection for over 16,000 fans at the Toyota Center.

The Extricom solution, implemented with the help of SignalShare, included LV-2000 switches, RP-22En access points with directional antennas, and our dedicated Networking Management System.

# Extricom LV-2000

## Large Venue Wireless LAN Switch Specifications

Standards Compliance	
WLAN	IEEE 802.11a/b/g/n IEEE 802.11e/WMM
Ethernet	IEEE 802.3x, full/half duplex IEEE 802.3af Power over Ethernet
Security	
Encryption	802.11i hardware-based encryption for: WEP-64 and WEP-128 WPA-TKIP / AES (CCMP) WPA2-TKIP / AES (CCMP)
Interfaces	
WLAN Ports (to APs)	Sixteen (16) Gigabit Ethernet ports
LAN Ports (Uplinked to wired LAN)	Two (2) Gigabit Ethernet RJ45/SFP Combo Ports
Physical Properties	
Installation Options	Rack mount (19" 1U) and desktop
Dimensions (W x H x D)	441 x 44 x 371mm (17.4 x 1.7 x 14.6")
Weight	3.6 kg (7.9 lbs)
LEDs	Power LAN Activity Activity on AP ports
Power	PoE to WLAN ports Built in IEEE 802.af injectors
Environmental	
Operational	Temperature: 0°C to 45°C (32°F to 113°F) Humidity: 0% to 90%, non-condensing
Storage	Temperature: - 20°C to +70°C (-4°F to 158°F) Humidity: 0% to 90%, non-condensing
Regulation Approval	

Safety	UL 60950-1 EN 60980-1
EMC	FCC Part 15 Class B EN 300386
Ordering Information	
LV-2000	Extricom LV-2000 Large Venue Wireless LAN switch platform
EXLC-LV	Extricom Software License for fully populated Extricom LV-2000 Wireless LAN switch platform with 16 Extricom Ultra-Thin APs
Related Products	
Extricom RP-22n	2-Radio 2x2 MIMO UltraThin 802.11a/b/g/n Access Point
Extricom RP-22En	2-Radio 2x2 MIMO UltraThin 802.11a/b/g/n Access Point with Connectors for External Antennas
Extricom RP-30n	3-Radio UltraThin 802.11a/b/g/n Access Point
Extricom RE-1000	PoE Range Extender
Extricom MC-1000	Media Converter
Extricom NMS	Extricom Network Management System

Note: Information is subject to change without prior notice.

### About Extricom

Extricom is a manufacturer of next generation enterprise wireless LAN solutions, based on its Channel Blanket™ technology. Extricom solutions are used by customers in numerous industries worldwide, including education, healthcare, warehousing, and a rapidly growing number of large entertainment and sports venues.

While adhering to the 802.11n standard, Extricom's patented topology provides wire-like reliability, high throughput, seamless mobility, unparalleled noise immunity, and is easy to install and maintain. In an era of intensive wireless usage powered by the market explosion of smart phones, iPads, iPods, tablets and other communication devices, voice, data, video, and location services are delivered with an always-on, robust and mobile Wi-Fi connection to any client, in any environment. Extricom Interference-Free™ WLAN is purpose-built to slash wireless complexity and future-proof your network for tomorrow's multi-service demands.

Extricom serves its growing global customer base through offices in the USA, Europe and Japan, and by working with a global network of distributors and partners.



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