Extricom

EXTRICOM WLAN SYSTEM

USER GUIDE

EXSW800
EXSW-1200
EXSW-2400
EXRP-20
EXRP-40
EXRP-20E
EXRP-40E
EXSW-1600
EXSW-8000

Version 3.1.24

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> **Important Notice:**
> Read this user manual and safety instructions before installing and operating the Extricom WLAN system.

Disclaimer

Extricom makes no representations or warranties, whether express or implied, that the Extricom wireless local area network (WLAN) system or any component thereof shall meet the purchaser's operating requirements or that system operation will be uninterrupted or error-free. All WLANs, including the Extricom WLAN system, can potentially be affected by outside sources of interference such as other broadcasting devices, radiation, device immunity level, and other external sources of interference.

Declaration of Conformity

Manufacturer's Name: Extricom Ltd.

Declares under our sole responsibility that the products:

Product Names: Extricom EXSW800, EXSW-1200, EXSW-2400 , EXSW-8000

Conform(s) to the following standard(s) or other normative document(s):

EMC:
FCC Part 15 Class B
EN 300386
VCCI V-3/2001.04
ANATEL Resolution 237

Safety:
EN 60950-1
UL 60950-1
IEC 60950-1
ANATEL Resolution 238

Environmental:
EU Directive 2002/95/EC of January 27, 2003, on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)

Manufacturer's Name: Extricom Ltd.

Declares under our sole responsibility that the product:

Product Name: Extricom EXRP-, EXRP-40 , EXRP-20E , EXRP-40E

Conforms to the following standard(s) or other normative document(s):

EMC: FCC Part 15 Class B
                           EN 301489
                           VCCI V-3/2001.04.

Radio: FCC Part 15 C
                           FCC Part 15 E
                           EN 300328
                           EN 301893
                           Japan Type Certificate: Article 2, clause 1
                           ANTEL Resolution 365

Safety: EN 60950-1
                           UL 60950-1
                           IEC 60950-1

Environmental: EU Directive 2002/95/EC of January 27, 2003, on the Restriction of the Use of
                           Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)

> *Note: This equipment has been tested ad found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.*
> *This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.*
>
> *If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the Following measures:*
>
> *- Reorient or relocate the receiving antenna.*
> *- Increase the separation between the equipment and receiver.*
> *- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
> *- Consult the dealer or an experienced radio/TV technician for help.*

! *This equipment has been approved for mobile applications where the equipment is to be used at distances greater than 20cm from the human body (with the exception of hands, wrists, feet and ankles). Operation at distances of less than 20 cm is strictly prohibited.*

Changes or modification to equipment not expressly approved by Extricom LTD are strictly prohibited and could void the user's license to operate the equipment.

Table of Contents

About This Guide

This guide provides detailed instructions for installing, configuring, and troubleshooting the Extricom EXSW800/1200/2400 WLAN switches and Extricom EXRP-20/40 UltraThin™ Access Point (AP).

Audience

This guide is intended for enterprise IT managers and system installers who are familiar with installing and configuring networks.

Conventions

> 🖎 This is a note. It provides additional information to users.

> **-** *This is a caution. A caution warns of possible damage to the equipment if a procedure is not followed correctly.*

> **!** *A warning alerts you to important operating instructions.*

Safety Precautions

Follow the instructions in the guide to ensure proper installation and operation of the switch and APs.

> **!** *The use of wireless devices is limited to the constraints imposed by local laws.*

- Operate the switch and APs in an indoor environment.
- Disconnect the switch and APs from power sources before servicing.

- The switch and AP enclosure must not be opened by anyone other than an authorized service representative.

- To comply with FCC RF exposure compliance requirements, maintain a minimal separation distance of at least 20 cm/8 inches between the AP and all persons.

- The switch contains an internal battery.

- Note that with EXSW-8000, the SFP modules are not shipped with product. You must use class 1 laser compliant with CDRH and/or EN 60825-1 See Appendix A for approved modules

> **!**
> - *Always replace the battery with the same type to avoid the risk of explosion.*
> - *Dispose of used battery according to the instructions provided with the new battery.*

Introduction to the Extricom Wireless LAN System

A Wireless Local Area Network (WLAN) based on the IEEE 802.11 standard enables laptops, PDAs, phones, and other "Wi-Fi" equipped devices to wirelessly connect to the enterprise network.

However, large scale deployments of traditional cell-based WLANs, in which each access point (AP) operates on a different channel than that of adjacent APs, have been hindered by issues such as poor coverage, low capacity, high-latency mobility, and expensive interference analysis or site survey and maintenance costs.

Extricom's WLAN, on the other hand, is a completely new solution. Referred to as the Interference-Free™ architecture, it eliminates the coverage and capacity trade-offs of traditional cell-based WLAN architecture. In addition, the need for cell planning and interference analysis, a highly expensive aspect of owning a WLAN, is also eliminated. Finally, Extricom's innovative approach does away with most WLAN maintenance tasks. Extricom's WLAN System is specifically designed to provide increased network capacity, seamless mobility, high level of security, and easy installation and configuration.

Overview of the Extricom WLAN System

The Extricom WLAN consists of a wireless switch (EXSW800/1200/2400) connected to a set of UltraThin™ APs (EXRP-20/40). The Extricom WLAN system eliminates the concept of cell-planning and replaces it with the "channel blanket" topology. In this topology, each Wi-Fi radio channel is used on every access point to create continuous "blankets" of coverage. By using multi-radio APs, the Extricom system is able to create multiple overlapping channel blankets from the same physical set of devices, as illustrated in Figure 1.
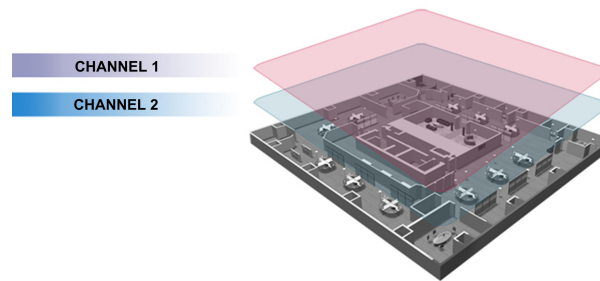
Figure 1. Two Channel Blanket Coverage

The Extricom solution is based on a fully centralized WLAN architecture, in which the switch makes all of the decisions for packet delivery on the wireless network. In this configuration, the access points (APs) simply function as radios, with no software, storage capability, or IP address. Even the basics of connecting are different: clients associate directly with the switch, not with the AP. The AP acts as an "RF conduit" to rapidly funnel traffic between the clients and the switch. The Extricom architecture has essentially centralized the 802.11 logic in the switch, while distributing the wireless electronics in the APs.

Centralization of the Wi-Fi environment enables enterprises to deploy 802.11a/b/g channels at *every* AP, creating multiple overlapping "channel blankets" that leverage each of the radios in the multi-radio UltraThin AP. Each channel's bandwidth is delivered across the blanket's service area (i.e. the combined coverage of all APs connected to the switch), with interference-free operation and consistent capacity throughout.

As the client moves throughout the blanket, different APs will be in the best position to serve the client at different times. The switch always uses the uplink and downlink path that is optimal to serve the client. While this is going on "behind the scenes," the client never experiences an AP-to-AP handoff (i.e. de-association and re-association), resulting in seamless mobility.

Within each channel blanket, the switch avoids co-channel interference by permitting multiple APs to simultaneously transmit on the same channel only if they won't interfere with each other. This is the essence of the TrueReuse™ functionality.

Features and Benefits

Extricom's WLAN system solution offers the following features:

- **Ease of deployment - No cell planning**
  Extricom's architecture requires no cell planning and experiences no constraints due to RF interference or channelization. Consequently, Extricom APs can be deployed wherever needed, in any density or even varying density, to meet the desired end-client service level (stipulated in terms of connection rate). The traditional site survey is therefore reduced to just physical equipment installation planning.

- **Multi-Layer WLAN**
  Using multiple radio Access Points, a single set of APs enables deployment of multiple high-data-rate channel blankets with overlapping coverage, resulting in multiplied aggregate capacity. Separate channel blankets also offer the unique ability to guarantee Quality of Service by physically segregating different user types, traffic, and roles onto different channels.

- **Same band operation**
  The Extricom WLAN system enables two WLAN channels, in the same band (e.g. Channel 1 and 6 in 2.4 GHz), to be simultaneously used within the same AP, to form overlapping channel blankets using the same physical set of APs.

- **TrueReuse bandwidth**
  TrueReuse technology multiplies the bandwidth of a standard 802.11 channel by dynamically optimizing the reuse of each frequency. Within a channel blanket, up to three APs are permitted to simultaneously transmit on the same channel, when the TrueReuse algorithm determines that they can do this without causing each other co-channel interference.

- **Zero-latency mobility**
  In an Extricom WLAN, wireless device remains on the same channel everywhere within the channel blanket. Inter-AP handoffs delays or packet loss do not occur as the client moves across the range of different APs.

- **WiFi collaboration**
  Extricom's patented WiFi Collaboration technology in which all APs are able to receive on the same channel, provides uplink path diversity for client transmissions, making the system highly resistant to RF instabilities and outside interference.

- **Dense AP deployment**
  In an Extricom WLAN, APs can be deployed in any density convenient to the enterprise, to achieve both blanket coverage and a guaranteed communications rate to all users. In fact, while cell-based solutions shy away from dense deployments because of their inherent RF obstacles, Extricom's system performance actually increases with AP density.

- **Wire-line quality VoWLAN**
  Extricom's Interference-Free architecture is perfectly suited for VoWLAN providing zero-latency mobility, voice and data separation, reduced power consumption, and high RF resiliency, all together resulting in superior voice performance.

- **IEEE 802.11i support**
  Extricom's products support WEP-64, WEP-128, WPA-TKIP, WPA2-AES (CCMP) encryption. The authentication modes supported include: RADIUS (802.1x) and WPA Pre-Shared Key (PSK).

- **Power save**
  Full power conservation management is enabled for associated mobile devices over unicast, multicast, and broadcast frames. For multicast and broadcast frames, the DTIM (Delivery Traffic Indicator Message) period is configurable.

- **Centralized configuration**
  New switches are added to the network via a single Web interface either manually by the user, or automatically using an Extricom protocol.

- **System redundancy**
  Extricom enables full redundancy by connecting two switches in parallel to different APs over the same area. The switchover parameters are user-configurable, and the Active to Standby switchover is seamless to the user.

- **SNMP**
  The Extricom system supports SNMP V2 based on standard and private MIBs, enabling the user to configure the switch using SNMP Set operations, read switch status using SNMP Get operation and determine the status of the system, including the status of APs and Redundancy statuses using SNMP Traps.

- **Rogue AP Detection**
  The Extricom system supports Rogue AP detection and reporting without the need for additional hardware. By using one radio in each of the multi-radio APs, the Extricom Rogue AP solution delivers the benefits of a dedicated security sensor network, without the costs of such a physical overlay.

- **Multiple RADIUS & RADIUS Redundancy**
  The Extricom system supports multiple RADIUS servers per ESSID, enabling the user to set redundancy between these RADIUS servers.

- **Network Time Protocol (NTP)**
  The Extricom system supports synchronization of the system clock over the network, thereby ensuring accurate local time keeping with reference to radio and atomic clocks located on the Intranet and/or Internet.

- **Fast Handoff (Opportunistic Key Caching)**
  WLAN clients roaming between APs of the same channel blanket within a single switch's coverage area will experience Zero-latency mobility . Clients roaming between different Extricom WLAN switches are subject to the 802.11i handoff mechanism. In addition to this, the Extricom system speeds up 802.11i handoff between Extricom switches by use of Extricom's inter-switch protocol. This technique enables the client to avoid repetitive 802.1x authentications, thereby enabling faster transition between Access Points connected to different switches with minimal session interruption.

Overview of the Extricom Switches

The Extricom EXSW800, EXSW-1200, the EXSW-2400 and the EXSW-8000 switches provide central control and configuration of the WLAN. The switches implement the Interference-Free architecture in the Extricom WLAN. The WLAN switches are connected to EXRP-20 or the EXRP-40 a APs to form an Extricom WLAN.

The EXSW800 switch can connect to up to 8 EXRP-20 APs each with two 802.11a/b/g radios, supporting two channel blankets.

The EXSW-8000, the Mega switch is introduced to extend WLAN radio access provided by the EXSW-2400 and EXSW-1200. It posses 8 Copper downlink ports to connect to 8 EXSW-2400/1200 switches and is able to push over 1GE Ethernet using 2 GE ports (two copper or fiber) .

The EXSW-1600 is GBE based edge switch, it can connect up to 16 GBE based Access Points and support 802.11a/b/g/n . It posses 16 Copper downlink ports to connect 16 EXRP-30n/40En and is able to push over 1GE Ethernet using 2 GE ports (two copper or fiber).

It posses 16 WALN GBE PoE ports and two combo port Copper/Fiber

The EXSW-1200 and EXSW-2400 can connect to EXRP-20 or EXRP-40 APs; he EXSW-1200 can connect to 12 APs and the EXSW-2400 switch can connect up to 24 APs. each with two or four 802.11a/b/g radios, supporting two or four channel blankets.

Figure 2. Extricom EXSW-2400 Switch

Figure 3. Extricom EXSW-1200 Switch

Figure 4. Extricom EXSW800 Switch

Figure 5. Extricom EXSW-8000 Switch

The EXSW-8000 switch (The Mega switch) aim is to allow Radio "blanket extension" , the EXW-8000 has 8 GE copper ports and s able to aggregate up to 8 EXSW-1200 or EXSW-2400 switches and provide coverage for up to 96 Extricom's AP .

6. Extricom EXSW-1600 Switch

The EXSW-1600 switch is a GBE based switch, it shall support existing Access points and new planned 802.11n Access points, the EXW-1600 posses 16 GbE copper PoE ports and is able to aggregate up to 16 Access points.

> *Note that with EXSW-8000/1600, the SFP modules are not shipped with product. You must use class 1 laser compliant with CDRH snd/or EN 60825-1*
> *See Appendix A for approved modules*

Configuring a switch and its associated set of APs is as simple as configuring a single traditional AP, greatly reducing the effort required to deploy and maintain the WLAN.The minimal configuration required for the switch is done via a dedicated secured Web interface.

> *The Extricom EXSW-1200 is derived from the EXSW-2400 , with the same hardware and software. The only difference between the two models is the number of WLAN ports supported.*

Overview of the Extricom Access Point

✍	• The Extricom access points are for indoor usage only.
	• The maximum antenna gain is 4dBi
	• Single Extricom Access Point includes multiple WLAN Radio modules; each Radio module is independent, it is configured separately and serves different set of clients. There is no relation between transmissions on different Radio modules, hence :
	    ○ Same information can not be transmitted over separated Radio modules
	    ○ Radio modules can not transmit simultaneously over the same radio channel
	    ○ Client can transmit and receive data through one Radio module.

Internal antenna access points

Extricom's EXRP-20 and EXRP-40 UltraThin APs are high-bandwidth devices, containing standard 802.11 radios. The EXRP-20 contains two radios while the EXRP-40 contains four radios.

Since the APs have no software, they require no configuration. This makes them fully interchangeable, enabling truly plug-and-play installation. If stolen, the APs do not pose a security risk, since all encryption is performed in the switch.

With all intelligence residing in the WLAN switch, APs may be placed as close together as necessary to provide high-quality, high-speed connectivity from all locations within the enterprise.

APs are connected to the Extricom WLAN Switch via standard Cat5e/6 cables. Since the APs are powered by the standard 802.3af Power over Ethernet (PoE), only a single Cat5e/6 cable connection is required to support two simultaneous radios.

Figure 7. Extricom EXRP-20 AP

Figure 8 Extricom EXRP-40 AP

Plenum Rated External Antenna Access points

FCC Safety Compliance Statement

When used with approved Extricom antennas, this product meets the uncontrolled environmental limits found in OET-65 . Proper installation of this radio according to the instructions found in this manual will result in user exposure that is substantially below the FCC recommended limits

Some applications may require an external antenna access point, for this purpose Extricom introduce a new Access point based on the same Hardware as the EXRP-20/EXRP-40 but with external antennas.

Extricom defined the EXRP-xxE access point series, EXRP-20E , two radio access point with Four external antenna connectors (parallel to EXRP-20) , the EXRP-40E Four radio access point with Eight external antenna connectors (parallel to EXRP-40) .

Exactly as internal antennas APs , the external antenna APs are connected to the Extricom WLAN Switch via standard Cat5e/6 cables. The APs are powered by the standard 802.3af Power over Ethernet (PoE), but could also be powered up by an external power supply as defined by the internal antennas APs.

The External antenna connecter is RP (reverse polarity female –U.fi SMA), users can buy Rubber duck 4dbi 2.4/5Ghz dual band antennas with right connectors and connect it to the APs.

The AP is IEEE 802.11n future ready and could be equipped with up to 12 External antennas , in fact, the same hardware can be used for 2 radio AP where only 4 connectors will be provided, 4 Radio where 8 connectors will be provided. Two 802.11n radio AP with 6 connectors and four 802.11n Radio AP with 12 connectors.

> **!** With EXRP-20E/40E - Use only xPVC or similar jacket cable which is NEC Article 725 and 444 Compliant and plenum rated per NFPA 262 (UL 910) standard

A Typical Extricom Wireless Network Topology

An Extricom WLAN switch is connected to the wired LAN, and the APs distributed throughout the enterprise. *Figure 9* shows a typical Extricom enterprise topology, consisting of an Extricom switch and eight APs.
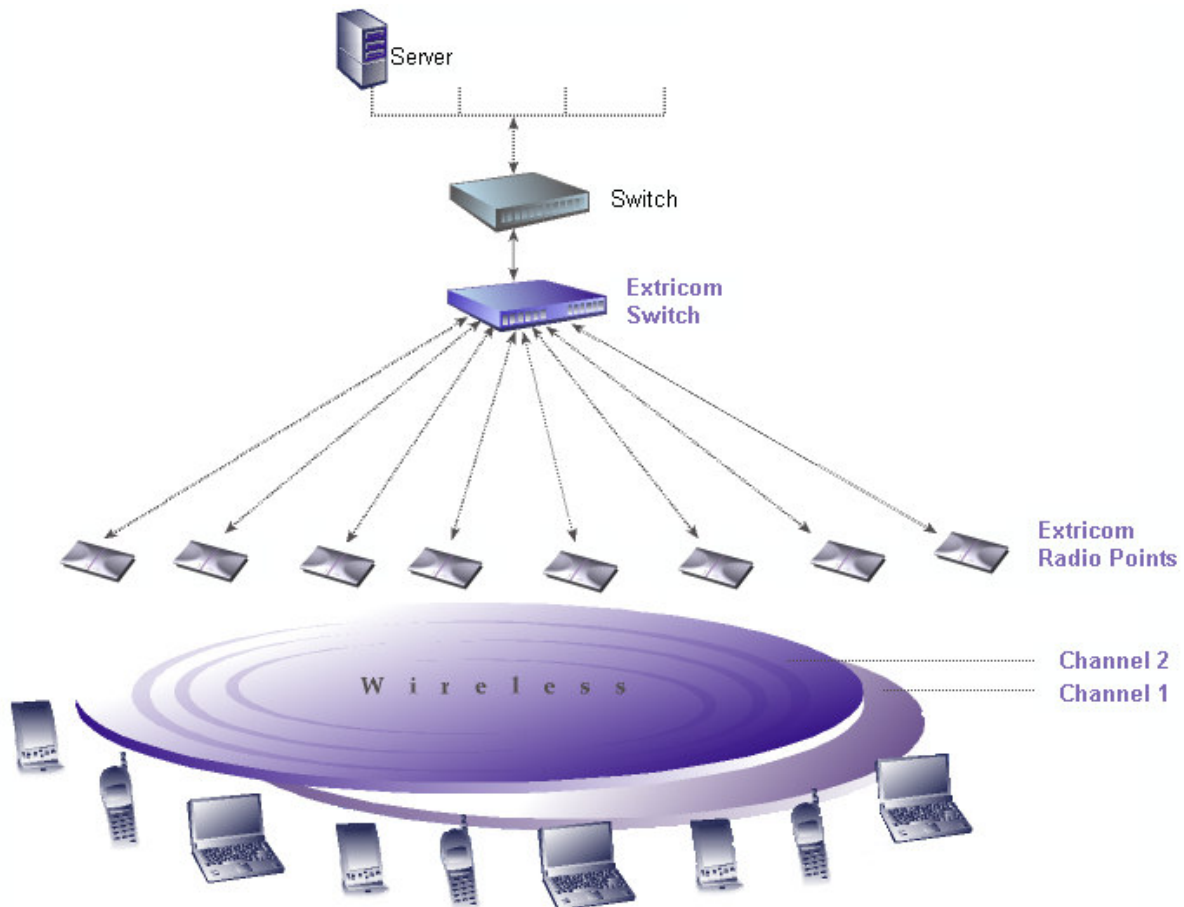

Figure 9. Typical Extricom Typology

Extricom uses standard WLAN protocols (IEEE 802.11). As a result, any 802.11a/b/g standard wireless device can work seamlessly with the Extricom system.