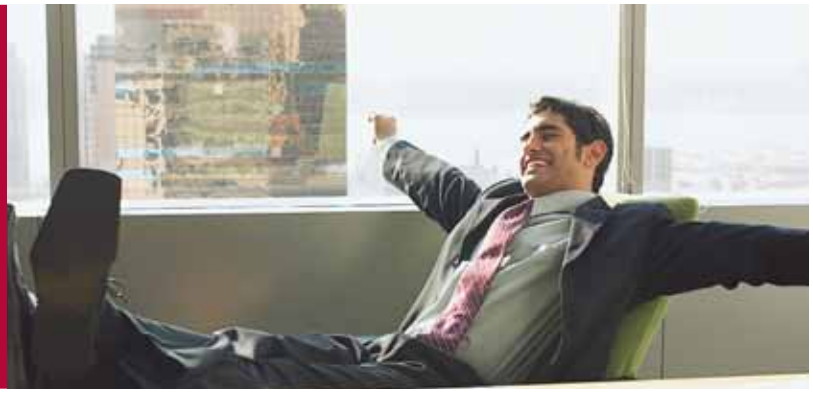
SPECTRUM

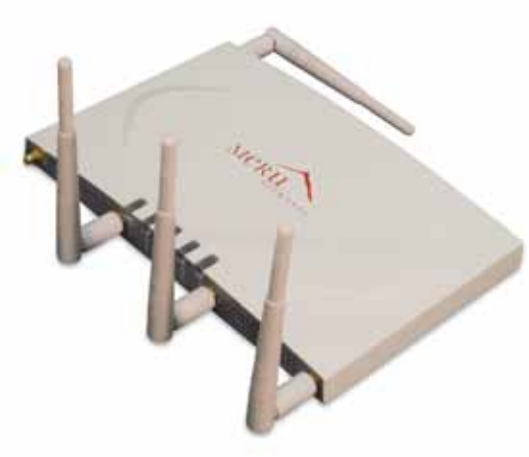
MERU **SPECTRUM MANAGER**

The Spectrum Manager takes information provided by a network of PSM3x Spectrum Analyzers and reports its findings in a graphical and report based form.



PSM3x EMPOWERED SPECTRUM ANALYZER

High-performance wireless engineered to expect the unexpected



PRODUCT OVERVIEW

The quality of your wireless network connection depends on how well the wireless spectrum is controlled. The wireless spaces that Wireless Local Area Networks (WLAN) operate in are used by other systems as well. Only Meru with its Air Traffic Control™ system has consistently demonstrated the ability to control access to the RF spectrum in a way that delivers high useable bandwidth to the end user predictably and consistently in the same way as a user has come to expect from the wired network. Only Meru delivers Wireless like Wired™ simplicity and reliability. Along with its' 99.99% wireless availability and toll-quality voice Service Assurance Program, Meru has led the industry in standing behind its claims.

Meru's virtualized WLAN long ago unlocked the secrets to dealing with radio interference caused by neighboring access points and used that information to improve end user experience and reduce operational costs. However, external sources of radio interference can affect user experience by impacting coverage, speed and in some cases causing loss of connection and if left unchecked, can spread to impact all available channels. Meru's Proactive Spectrum Manager (PSM) already provides a means of detecting and avoiding interference and noisy channels, but now with the addition of Spectrum Manager combined with the PSM3x Spectrum Analyzers, Meru is taking it to the next level. Spectrum Manager will allow you to find and classify the sources of interference such as cordless phones, gaming controllers, Bluetooth devices, microwave ovens and other non-WLAN devices. Detecting these type of devices enables them not just to be avoided, but to also to eliminate them when needed. Having identified the type and source of the interference in a particular band, the source can then be removed, adjusted or worked around.

Product Benefits

- Classify sources of interference such as cordless phones, gaming controllers, Bluetooth devices, and more
- Utilizes a network of PSM3x Spectrum Analyzers
- Reports findings in a graphical and report based form
- Interferer data includes type of interferer, signal strength (current, average, maximum), impacted WLAN channels, start time, end time and duration of interference

SPECTRUM

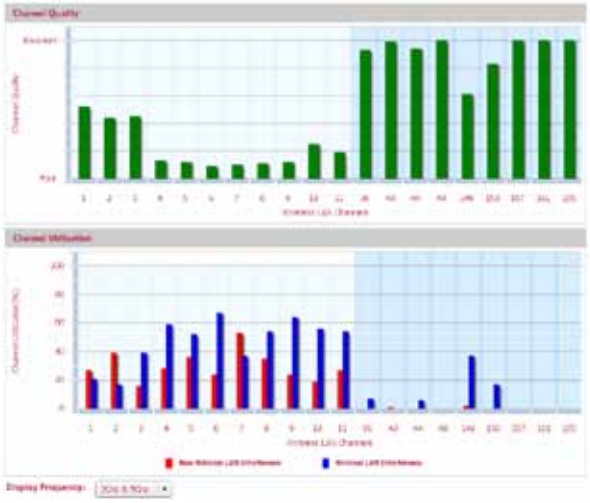
Spectrum Manager takes information provided by a network of PSM3x Spectrum Analyzers and reports its findings in a graphical and report based form. By showing you how congested your wireless spectrum is, it allows you to take the necessary actions.

The PSM3x Spectrum Analyzer is a RISC based subsystem in a sensor that is dedicated to monitoring the airwaves 100% of the time. By having a dedicated subsystem, the PSM3x is able to classify and report on the type and source of interference almost instantly and without taking CPU resources away from the wireless radio.

While other systems may change the channels of Access Points to try to avoid potential interference, it often leads to a worse degradation of the overall performance of the network as the underlying systems were not designed to cope with so many Access Points sharing the same channel. Only Meru is designed to work with as little as one available channel and still provide a better user experience over systems requiring multiple available channels. With Meru, all or part of the network can be moved to a clearer channel and then Meru's Air Traffic Control is able to partition the wireless airspace and deliver high quality connections to the wireless users.

Channel Management Display

The Channel Management Display provides visibility into the calculated channel quality for each of the WLAN channels (right chart), as well as the level of interference detected on each channel (bottom chart). The interference is differentiated between WLAN interference and non-WLAN interference on the bottom chart, along with the channel utilization percentage from each type of interference.



Interference Log

Spectrum Manager automatically classifies RF interference from multiple sources and creates interference logs of current and historical interference detected.

Details on each interferer include type of interferer, signal strength (current, average, maximum), impacted WLAN channels, start time, end time and duration of interference. When an interferer is detected, a log entry is created in the interference log. While an interferer is active, the status indicator in the log entry is red and the text for the log entry is bold. When an interferer becomes inactive, the associated status indicator changes to gray and the log entry text changes to non-bold.

Interference Log for: 172.27.0.167

Interferer Type	Strength Cur/Avg/Ma	Affected Channel(s)	Center Fre	Duration	Start Time	Stop Time
Microwave Oven	-41 / -41 / -29	5,6,7,8,9,10,11,12,13,14	2454187 kHz	00:00:49	Tue May 18 2010 10:08:31 AM	Tue May 18 2010 10:09:20 ...
Microwave Oven	-31 / -31 / -29	8,9,10,11,12,13,14	2460281 kHz	00:00:50	Tue May 18 2010 10:01:32 AM	Tue May 18 2010 10:02:22 ...
Bluetooth	-84 / -84 / -65	1,2,3,4,5,6,7,8,9,10,11,12...	2439812 kHz	00:05:31	Tue May 18 2010 09:41:55 AM	Tue May 18 2010 09:47:26 ...
FHSS Cordless Phone	-45 / -45 / -42	3,4,5,6,7,11,12,13,14	2477000 kHz	00:00:01	Tue May 18 2010 09:44:54 AM	Tue May 18 2010 09:44:55 ...
FHSS Cordless Phone	-77 / -77 / -66	3,4,5,6,7,8,9,10,11,12,13,14	2460906 kHz	00:00:20	Tue May 18 2010 09:43:13 AM	Tue May 18 2010 09:43:33 ...
Microwave Oven	-35 / -35 / -1	3,4,5,6,7,8,9,10,11,12,13,14	2458250 kHz	00:02:08	Tue May 18 2010 09:24:57 AM	Tue May 18 2010 09:27:05 ...
Microwave Oven	-29 / -29 / -6	3,4,5,6,7,8,9,10,11,12,13,14	2441531 kHz	00:01:02	Tue May 18 2010 09:03:18 AM	Tue May 18 2010 09:04:20 ...
Microwave Oven	-28 / -28 / -15	2,3,4,5,6,7,8,9,10,11,12,1...	2449031 kHz	00:03:40	Tue May 18 2010 08:54:52 AM	Tue May 18 2010 08:58:32 ...
Bluetooth	-82 / -82 / -46	1,2,3,4,5,6,7,8,9,10,11,12...	2477000 kHz	00:01:09	Tue May 18 2010 08:53:50 AM	Tue May 18 2010 08:54:59 ...
Bluetooth	-92 / -92 / -79	1,2,3,4,5,6,7,8,9,10,11,12...	2460906 kHz	00:00:03	Tue May 18 2010 08:52:00 AM	Tue May 18 2010 08:52:03 ...
Bluetooth	-91 / -91 / -72	1,2,3,4,5,6,7,8,9,10,11,12...	2472937 kHz	00:00:05	Tue May 18 2010 08:49:01 AM	Tue May 18 2010 08:49:06 ...
Bluetooth	-85 / -85 / -69	1,2,3,4,5,6,7,8,9,10,11,12...	2479968 kHz	00:02:13	Tue May 18 2010 08:45:25 AM	Tue May 18 2010 08:47:38 ...
Bluetooth	-85 / -85 / -42	1,2,3,4,5,6,7,8,9,10,11,12...	2462937 kHz	00:11:34	Tue May 18 2010 08:30:57 AM	Tue May 18 2010 08:42:31 ...
Microwave Oven	-39 / -39 / -15	1,2,3,4,5,6,7,8,9,10,11,12...	2461375 kHz	00:02:12	Tue May 18 2010 08:37:21 AM	Tue May 18 2010 08:39:33 ...
Microwave Oven	-24 / -24 / -17	7,8,9,10,11,12,13,14	2469187 kHz	00:01:38	Tue May 18 2010 08:34:26 AM	Tue May 18 2010 08:36:04 ...
Microwave Oven	-53 / -53 / -17	5,6,7,8,9,10,11,12,13,14	2456375 kHz	00:00:57	Tue May 18 2010 08:14:16 AM	Tue May 18 2010 08:15:13 ...

SPECTRUM TECHNICAL SPECIFICATIONS

KEY FEATURES

Detection and classification of RF interferers including:

- Microwave ovens (conventional)
- Microwave ovens (inverter)
- Wireless video cameras (analog and digital)
- Analog cordless phones
- FHSS cordless phones
- DSSS cordless phones
- Bluetooth devices
- Wireless baby monitors
- Wireless gaming controllers
- RF Jammers
- Motion Detectors (S-Band radar-based)

1-4 second typical classification time
802.11 preamble detection (OFDM and DSSS)
Estimates channel utilization for both 802.11 and non-802.11 traffic

SPECTRUM ANALYZER RADIO

Embedded classification processor with dedicated memory
40MHz analysis bandwidth
80MHz sampling frequency
Concurrent 2.4GHz and 5GHz WLAN frequency band sampling
-90 dBm to 0dBm detection range
Frequency bands. 2.4GHz to 2.5GHz and 4.9GHz to 5.875 GHz

IEEE802.11n

Frequency Band
2.402 to 2.485 GHz, 5.15 to 5.25 GHz, 5.725 to 5.825 GHz
Operating Channels
1 through 11 for 2.4 GHz band
32 through 160 for 5 GHz band
Data Rates (Mbps)
20 MHz: 130, 117, 104, 78, 65, 58.5, 54, 52, 48, 39, 36, 26, 24, 19.5, 18, 13, 12, 11, 9, 6.5, 5.5, 2, 1 Mbps
40 MHz: 300, 270, 243, 216, 162, 135, 121.5, 108, 81.5, 81, 54, 48, 40.5, 36, 27.5, 27, 24, 18, 13.5, 12, 11, 9, 6, 5.5, 2, 1 Mbps with automatic rate adaption
Average Transmit Power
2.4n (20 HT): 17 dBm, 2.4n (40 HT): 16 dBm
5.0n (20 HT): 18 dBm, 5.0n (40 HT): 16 dBm
Receive Sensitivity (for max data rates)
11a: -77 dBm, 11n (5 GHz): –72 dBm, 11g: -77 dBm,
11n (2.4 GHz): -74 dBm

IEEE802.11a

Frequency Band
5.180 – 5.240 GHz; 8 Channels (34, 36, 38, 40, 42, 44, 46, 48),
5.280 – 5.320 GHz; 4 Channels (52, 56, 60 and 64),
5.745 – 5.825 GHz; 5 Channels (149, 153, 157, 161, and 165),
5.500 – 5.700 GHz: 11 channels (100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140)
Operating Channels Configurable based on country regulations
Data Rates (Mbps)
54, 48, 36, 24, 18, 12, 9 and 6 Mbps with automatic rate adaptation
Average Transmit Power 17 dBm
Receive Sensitivity -77 dBm at 54 Mbps and -89 dBm at 6 Mbps

IEEE802.11b/g

Frequency Band
Hardware supports 2.40-2.50 GHz: 2.4 GHz – 2.4835 GHz (US, Europe), 2.4 GHz – 2.497 GHz (Japan only)
Operating Channels
1-11 US/Canada, 1-13 Europe and 1-14 Japan
3 non-overlapping channels
Average Transmit Power 17 dBm
802.11b Data Rates
11, 5.5, 2 and 1 Mbps with automatic rate adaptation
802.11g Data Rates
54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1 Mbps with automatic rate adaptation
802.11b/g Receive Sensitivity
-73 dBm at 54 Mbps and -84 dBm at 1 Mbps

PHYSICAL SPECIFICATIONS

Dimensions
9 7/8"width x 6 7/8"height x 1 1/16"depth
(25 cm width x 17.5 cm height x 2.7 cm depth)
Weight 3lbs 0 oz. (1.36 kgs)
Power
802.3af PoE, 802.3 at 5V DC input
Draws 11.5W to 17W depending on configuration
Environmental
Operating Temperature: 0° to 50° C (32° F to 122° F)
Operating Humidity: 90% (non-condensing)
Storage Temperature: -10° to +70° C ambient
Storage Humidity: 95% (non-condensing)
Interfaces
1 Auto sensing 10/100/1000 Base-TX Ethernet (RJ-45)
Dual-band Radio supports any combination of 802.11n, 802.11a, 802.11b, 802.11g
4 External antenna interfaces (reverse polarity SMA)
Kensington MicroSaver Lock compatible
1 RJ45 console port (reserved for future use)
5 LEDs
Standard Warranty
Limited lifetime warranty

Meru Networks | develops and markets wireless infrastructure solutions that enable the All-Wireless Enterprise. Its industry-leading innovations deliver pervasive, wireless service fidelity for business-critical applications to major Fortune 500 enterprises, universities, healthcare organizations and local, state and federal government agencies. Meru's award-winning Air Traffic Control technology brings the benefits of the cellular world to the wireless LAN environment, and its WLAN System is the only solution on the market that delivers predictable bandwidth and over-the-air quality of service with the reliability, scalability and security necessary to deliver converged voice and data services over a single WLAN infrastructure.

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