Data Sheet

OS Spectra & OS Spectra Lite

True Non-Line-of-Sight Wireless Networks

OS-SPECTRA FAMILY OF PRODUCTS

Spectrum-Efficient, High-Availability Wireless Ethernet Bridges

Reliable, High-Speed Solutions with More Range and Capacity for Challenging Non-Line-of-Sight and Long-Range Line-of-Sight Environments, Including Those Over Water

Integrated

Connectorised

You Shouldn't Need a License to Speed

With wireless Ethernet bridging, you have always needed a license to go fast. Because a license reserved a part of the radio spectrum just for you, wireless links encountered less interference, and, as a result, could go farther, faster, at higher capacity and with greater reliability.

Orthogon Systems has changed all that with its family of OS-Spectra products. The OS-Spectra point-to-point, 5.8 GHz wireless Ethernet bridges bring together the speed and reliability of licensed wireless with the flexibility of the unlicensed space. You no longer have to suffer the delay and expense of applying for a license to set up your IP and circuit-switched wireless networks.

There are four products within the OS-Spectra line:

- **OS-Spectra Integrated:** With up to 300 Mbps Ethernet data rate and a built-in antenna, the OS-Spectra Integrated is the perfect choice for any environment – near- or Non-Line-of-Sight, Line-of-Sight and high-interference environments – where high throughput is a major requirement and/or dual E1/T1 capability is needed.

- **OS-Spectra Lite Integrated:** The OS-Spectra Lite includes all the same robust technology of the OS-Spectra Integrated, but at less cost. It's an excellent solution in any environment where you need more speed and bandwidth than the 44 Mbps provided by our OS-Gemini Integrated system, and/or single E1/T1 capability is required. With up to 150 Mbps Ethernet data rate, the OS-Spectra Lite is software upgradeable to 300 Mbps as throughput requirements increase.

- **OS-Spectra Connectorised:** The OS-Spectra Connectorised combines all the innovative Orthogon technology found in the OS-Spectra Integrated with the extra advantage of external antennas. Over long distances and in extremely adverse environments, including deep Non-Line-of-Sight, this solution lets you connect over greater distance and at a higher level of reliability and speed than other wireless bridges.

- **OS-Spectra Lite Connectorised:** With all the performance and reliability of the OS-Spectra Connectorised, this solution delivers up to 150 Mbps in extremely adverse environments – at less cost. Then as bandwidth requirements grow, you can easily upgrade from 150 Mbps to 300 Mbps.

In Non-Line-of-Sight environments, both Connectorised systems can increase link availability up to 99.999%. Prior to purchase, you can use our OS-Spectra Link Estimator to predict link reliability and throughput for your specific wireless application. (A list of Orthogon-approved antennas that meet FCC requirements is provided on our web site.)

Higher Spectrum Efficiency

Utilizing only 30 MHz of the 5.8 band and delivering up to 300 Mbps Ethernet data rates, the OS-Spectra systems are over 300% more spectral-efficient than our nearest competitor. Network performance is significantly improved as a result of less crowding within the band and subsequently less interference.

Interference Mitigation

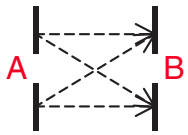
In the event OS-Spectra does encounter interference, it automatically applies these mitigation techniques to vastly increase the likelihood that your wireless network will work:

- **Advanced Spectrum Management with *i*-DFS:** Our *intelligent* Dynamic Frequency Selection (*i*-DFS) is at the heart of our exceptional spectrum management capabilities. At power-up and all during operation, OS-Spectra scans the band – 500 times a second – and automatically switches to the clearest channel. Our 25-hour, time-stamped database alerts you to any interference that does exist and provides statistics that help you pinpoint which channels offer the clearest data paths. This is "licensed-band, interference-free performance in an unlicensed band!"

- **Adaptive Modulation:** Transmitter and receiver negotiate the highest mutually sustainable data rate – then dynamically "upshift" and "downshift" the rate as conditions change. OS-Spectra always provides the maximum performance possible within the current power limits.

Very High Throughput

With 256 QAM modulation, OS-Spectra delivers a faster data stream using less of the available 5.8 GHz frequency band. Its dual transceivers at each end of the link allow you to send two parallel data streams at once. These transceivers can also send redundant streams, offering much greater range compared to competitive solutions, especially over water or in Non-Line-of-Sight conditions.



Data from A to B – or B to A – is sent on four signals, increasing by 300 times the likelihood data will get through.

- **More Range to Anywhere:** OS-Spectra links have class-leading sensitivity and power output, which enable the links to go farther, regardless of conditions. Orthogon Systems is the only manufacturer to combine Multi-Beam Space Time Coding, *intelligent* Orthogonal Frequency Division Multiplexing (*i*-OFDM) and our advanced signal-processing algorithms. This combination allows OS-Spectra to create four simultaneous signals between pairs of transceivers at each end of the link, without losing spectrum efficiency. This technique increases signal integrity by an unprecedented 300 times.

  In non-adverse environments, each pair of transceivers can operate in parallel, in effect creating two links and doubling throughput.

- **E1/T1 Ports Mean More Ways to Use the Band:** In a crowded radio-frequency (RF) area, the unlicensed spectrum may not allow for a wide channel, but that does not narrow your options. OS-Spectra's innovative architecture combines an abundance of Ethernet and circuit-switched options. Whether your infrastructure is based on Ethernet over copper or multimode fiber… 10/100/1000 Base T or 1000 Base SX…or even E1/T1 ports that bundle circuit-switched connectivity with IP service, you can connect with one wireless solution: OS-Spectra.

More than WiMAX-Compatible

The OS-Spectra (300 Mbps system) is capable of backhauling the throughput requirements of up to 12 WiMAX base station sectors, occupying the equivalent of only three WiMAX channels. This leaves more channels available for WiMAX point-to-multipoint links with no performance penalty. Plus, OS-Spectra is designed to fully integrate with other WiMAX systems, allowing end-to-end management of your infrastructure.

- **Managing the Spectrum for Maximum Throughput and Reliability:** OS-Spectra monitors all available channels and dynamically selects those over which it can sustain both the highest data rate and the most reliable availability. This means the bridge is very likely to find a clear channel (without operator intervention) even in a crowded space, allowing the transmitter and receiver to automatically use the frequency with the highest throughput. You can also lock the frequency manually (in either direction) and restrict each link to specified frequencies.

Reassuring, Robust Security

With Orthogon's unique software, each wireless bridge will communicate only with its matched counterpart at the other end of the link – and with no other. That communication is also encoded using a unique scrambling mechanism. Another layer of security is provided with 128-bit AES encryption (optional).

Power Up and Point

An OS-Spectra link comprises two outdoor units (ODUs), two powered indoor units, called the OS-Spectra PIDU *Plus*, and the required mounting equipment. The systems also contain embedded web servers to manage the link either locally or remotely. Setup is simply "power up and point." Large antenna beam-width simplifies the initial connection, and an audio tone helps the installer optimise link alignment.

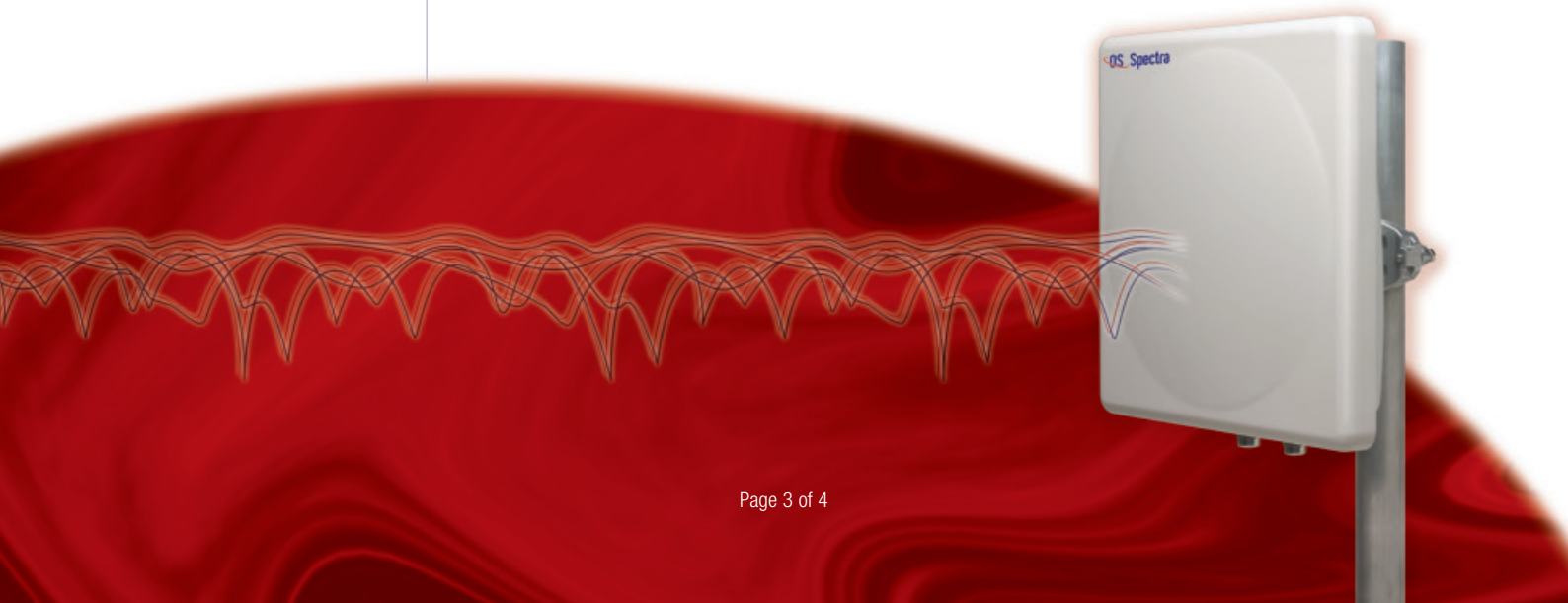
Productivity Payoff

OS-Spectra's performance means more productive users, less interference, lower cost of ownership and fewer connection points. OS-Spectra is often the lower-cost option when you consider:

- The business impact from being able to connect in an area already saturated with RF
- The capabilities to support more bandwidth-sensitive applications, such as multimedia or voice-over-IP
- The ability to backhaul more local loops using a single link
- The impact of having higher reliability and speed without having to pay licensed spectrum fees

Put OS-Spectra To Work for You

- **Service Providers:** With its multi-level security, ability to connect E1/T1 ports for bundled connectivity and significant WiMAX backhaul capability, OS-Spectra supports sophisticated convergent, multimedia applications, supplying services to large, widespread customer bases.
- **Vertical Markets:** Whether migrating from an analog to a digital network, linking separate networks within a building or linking networks in a campus setting, OS-Spectra offers high-throughput and reliability for multiple applications in a variety of markets, including utilities, transportation, healthcare, government and education.
- **Enterprises:** OS-Spectra supports high-bandwidth enterprise applications in environments where wired networks are either too expensive or impossible to implement. It efficiently uses the frequency spectra to reduce interference and boost performance for business-critical applications.



Technical Specifications for the

OS-Spectra Systems

Radio Technology	Remarks
RF band	5.725 GHz – 5.850 GHz (ISM)
Channel size	30 MHz
Channel selection / dynamic frequency control	By *Intelligent* Dynamic Frequency Selection (*i*-DFS) or manual intervention; automatic selection on start-up and continual adaptation to avoid interference; 10 MHz step size for WiMAX compatibility
Transmit power control	Varies with modulation mode and settings from 0 dBm to 25 dBm
System gain	**Integrated:** Varies with modulation mode and antenna type between 163 dB and 128 dB with 23 dBi integrated antenna **Connectorised:** Varies with modulation mode and antenna type between 76 dB and 116 dB, with 8-foot antenna up to 197 dB gain is available
Receiver sensitivity	Adaptive, varying between -91 dBm and -58 dBm
Modulation	Dynamic; adapting between BPSK single and 256 QAM dual
Error correction	FEC, ARQ
Duplex scheme	TDD ratio: Dynamic or Fixed; same or split frequency Tx/Rx
Antenna: type / gain / B / W	**Integrated:** Integrated flat plate 23 dBi / 7° **Connectorised:** External antenna connected via 2 x N-type female
Range	Up to 200km (124 miles)*
Security & encryption	Proprietary scrambling mechanism; optional AES 128 Bit Encryption
	** In all cases the range limit is set by the latest software release*

Ethernet Bridging & E1/T1	Remarks
Protocol	IEEE 802.3
User data throughput	**OS-Spectra:** Dynamically variable up to 300 Mbps at the Ethernet (aggregate) **OS-Spectra Lite:** Dynamically variable up to 150 Mbps at the Ethernet (aggregate)
Latency	1 ms each direction typical
Interface	10 / 100 / 1000 Base T (RJ-45) – auto MDI/MDIX, 1000 Base SX option
E1/T1 Interface	G703/G704 G823/G824 **OS-Spectra:** Provides dual E1/T1 ports **OS-Spectra Lite:** Provides a single E1/T1 port

Management & Installation	Remarks
LED indicators	Power status, Ethernet link status and activity
System management	Web or SNMP using MIBII, WiMAX and private MIB
Installation	Built-in audio assistance for link optimisation
Connection	Distance between outdoor unit and primary network connection: up to 100 metres (330')

Physical	Remarks
Dimensions	**Integrated Outdoor Unit (ODU):** Width 370 mm (14.5"), Height 370 mm (14.5"), Depth 95 mm (3.75") **Connectorised ODU:** Width 309 mm (12.2"), Height 309 mm (12.2"), Depth 105 mm (4.1") **PIDU *Plus* (Powered Indoor Unit):** Width 250 mm (9.75"), Height 40 mm (1.5"), Depth 80 mm (3")
Weight	**Integrated ODU:** 5.5 kg (12.1 lbs) including bracket **Connectorised ODU:** 4.3 kg (9.1 lbs) including bracket **PIDU *Plus*:** 864 g (1.9 lbs)
Wind speed	242 kph (150 mph)
Power supply	Integrated with Indoor Unit
Power source	90-240 VAC, 50-60 Hz / 36-60V DC; redundant powering configurations supported
Power consumption	55 W max

Environmental & Regulatory	Remarks
Operating temperature	-40°C (-40°F) to +60°C (+140°F), including solar radiation
Protection & safety	UL60950; IEC60950; EN60950; CSA-C22.2 No. 60950
Radio	FCC Part 15, sub-part C 15.247, Eire ComReg 03/42, UK Approval to IR2007
EMC	USA-FCC Part 15, Class B; Europe-EN 301 489-4

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