

High-Availability 5.4 and 5.8 GHz Wireless Ethernet Bridges

Your Solutions for Obstructed and High-Interference Environments as well as Long-Range Line-of-Sight Links, Including Those Over Water

DATA SHEET

MOTOROLA POINT-TO-POINT
BROADBAND WIRELESS SOLUTIONS

MOTOROLA OS-GEMINI AND
MOTOROLA OS-GEMINI LITE



Which word best defines success in wireless connectivity? Is it availability? Reliability? How about speed?

Consider this: 85% of properties 1500 feet (457 meters) apart have no optical Line-of-Sight path between their roofs. For them, a conventional wireless solution won't work 75% of the time. Motorola OS-Gemini solutions succeed over 99% of the time.

Operating in the 5.4 GHz and 5.8 GHz unlicensed bands, the Motorola OS-Gemini (formerly Orthogon Systems OS-Gemini) point-to-point wireless Ethernet bridges succeed where more conventional solutions disappoint. The systems achieve far more reliable connections, much more often, at faster data rates – because OS-Gemini solutions can maintain as high as 99.999% availability in challenging environments. Even in supposedly connection-friendly applications, OS-Gemini radios protect against the transient attenuation, fading and dispersion that degrade all wireless signals. (It is recommended that regulatory conditions for radio-frequency bands be confirmed prior to system purchase.)

There are four products within the OS-Gemini line of point-to-point wireless Ethernet bridges:

- **Motorola OS-Gemini Integrated:** With up to 43 Mbps Ethernet data rate and a built-in antenna, the OS-Gemini Integrated is the perfect choice for Non-Line-of-Sight (NLoS) and near-Line-of-Sight (nLoS) environments.
- **Motorola OS-Gemini Lite Integrated:** The OS-Gemini Lite Integrated includes all the same robust technology of the OS-Gemini Integrated, but at less cost. It's an excellent entry-level solution for growing WISPs and ISPs and for any budget-constrained organization that needs a robust solution to overcome interference and navigate obstructions. With up to 21 Mbps Ethernet data rate, the OS-Gemini Lite is software upgradeable to 43 Mbps as throughput requirements increase.
- **Motorola OS-Gemini Connectorized:** The OS-Gemini Connectorized combines all the innovative technology found in the OS-Gemini Integrated with the high-gain advantage of external antennas. In extremely adverse environments, including deep Non-Line-of-Sight, this solution lets you connect over greater distance, at a higher level of reliability and at higher speed than other wireless bridges.
- **Motorola OS-Gemini Lite Connectorized:** With all the performance and reliability of the OS-Gemini Connectorized, at less cost, this solution delivers up to 21 Mbps in extremely adverse environments. Then as bandwidth requirements grow, you can easily upgrade from 21 Mbps to 43 Mbps.



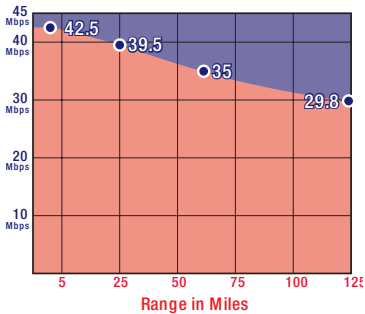
Integrated



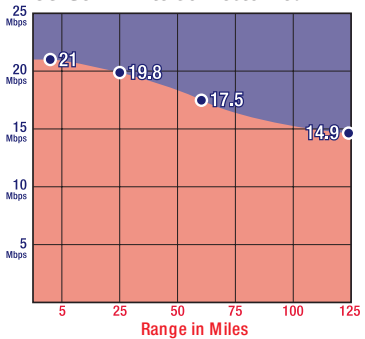
Connectorized

OS-Gemini's success (and therefore yours as well) results from a unique combination of technologies...

Performance with Motorola OS-Gemini Connectorized



Performance with Motorola OS-Gemini Lite Connectorized



How Far Will Motorola OS-Gemini Connectorized Take You?

Each Motorola OS-Gemini and OS-Gemini Lite Connectorized radio connects to an external antenna to increase signal gain, and, therefore, the range and robustness of the link. As the diagrams show, throughput rates remain consistently high from a distance of a few miles to 124 miles (200 km). At the maximum range, 29.8 Mbps and 14.9 Mbps Ethernet data rates – OS-Gemini and OS-Gemini Lite respectively – can be sustained over a Line-of-Sight path, using a six-foot antenna. (A list of approved antennas that meet FCC requirements is provided on our web site.) In Non-Line-of-Sight environments, both Connectorized systems can increase link availability up to 99.999%. Prior to purchase, you can use Motorola's OS-Gemini Link Estimator to predict link reliability and throughput for your specific wireless application.

A Unique Technology Combination

OS-Gemini's success (and therefore yours as well) results from a unique combination of technologies – the overall effect of which is much more powerful than using any of them individually. You can acquire this combination in a surprisingly small form factor that is easy to install and maintain, even in aesthetically or physically restrictive environments. These technologies include:

Multiple-Input Multiple-Output (MIMO): OS-Gemini radiates multiple beams from the antenna – the effect of which is to significantly protect against fading and to radically increase the probability that the receiver will decode a useable signal.

Best-In-Class Radio: A powerful transmitter combined with a super-sensitive receiver delivers a class-leading 168 dB system gain. This is 25 times better than the performance of our closest competitor.

Intelligent Orthogonal Frequency Division Multiplexing (i-OFDM): OFDM is now the industry-recognized method of reducing interference caused by signals that take multiple paths arriving out of phase at the receiver. OS-Gemini takes this technology further by using more sub-carriers and pilot tones than our competitors to provide class-leading capability for handling multipath dispersion and instant fade recovery.

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-Gemini 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-Gemini always provides the maximum performance possible within the current power limits.



Spatial Diversity: Having the capabilities of Spatial Diversity, OS-Gemini radios enable two distinct paths that are not simultaneously affected by fading or multipath – giving you a very reliable link in adverse conditions.

Power Up and Point

Motorola OS-Gemini radios are easy to install and automatically select the clearest channel, modulation scheme and transmit power for the link. A link comprises two outdoor units and two indoor units complete with the required mounting kit. Large antenna beamwidth simplifies the initial connection, and an audio tone helps the installer to optimize link alignment. The indoor unit (about the size of a pocket dictionary) connects to power and your LAN. The small outdoor unit is a neutral color, making it ideal for aesthetically restrictive areas.

Productivity Payoff

OS-Gemini's performance means more productive users, fewer connection points and, ultimately, much lower cost of ownership. You avoid the expense of leased lines, the disruptions of unreliable service and the hassles of trying to find Line-of-Sight locations. Motorola OS-Gemini is usually the lower-cost option when you consider:

- The business impact from low-availability and unreliable or slow wireless solutions
- Easy remote management and maintenance with our onboard software
- The effects of relocations, foliage growth or building construction

Put Motorola OS-Gemini to Work for You

Service Providers: Where geography is a challenge and infrastructure a priority, mobile operators and Internet providers can offer super-reliable, robust coverage. Simply use OS-Gemini to backhaul traffic from multiple wireless LAN access points to a point of presence.

Vertical Markets: Are you looking to create a seamless meshed network over a wide geographic area covering multiple buildings and open spaces? OS-Gemini is an extraordinarily cost-effective, high-powered alternative for a wide variety of organizations including government agencies, universities, schools and hospitals.

Enterprises: A single OS-Gemini link can provide a high-capacity, secure link, quickly creating a seamless local area network between company headquarters and a warehouse, branch office, service center or other facility.

The Motorola OS-Gemini products are available through value-added distributors around the world. Our Authorized Distributors can be found in our Partner section at <http://www.orthogonsystems.com/partners/partners.html>. Distributors are listed under the "Where to Buy" links within each respective Geographic Territory.

Motorola OS-Gemini operates over the license-exempt 5.4 GHz and 5.8 GHz bands and involves no ongoing expense – so cost of ownership is low and ROI is typically less than one year.

That's another definition of success.

Motorola Gemini 5.4 Part Numbers

- 2413 OS-Gemini 5.4 Integrated
- 2414 OS-Gemini 5.4 Connectorized
- 2415 OS-Gemini Lite 5.4 Integrated
- 2416 OS-Gemini Lite 5.4 Connectorized

Motorola Gemini 5.8 Part Numbers

- 1770 OS-Gemini 5.8 Integrated
- 1800 OS-Gemini 5.8 Connectorized
- 1771 OS-Gemini Lite 5.8 Integrated
- 1804 OS-Gemini Lite 5.8 Connectorized

Technical Specifications for the MOTOROLA OS-GEMINI SYSTEMS

RADIO TECHNOLOGY	REMARKS
RF band	5.725 GHz–5.850 GHz* 5.470 GHz–5.725 GHz*
Channel size	12 MHz
Channel selection/ dynamic frequency control	By <i>Intelligent</i> Dynamic Frequency Selection (i-DFS) or manual intervention; automatic detection on start-up and continual adaptation to avoid interference
Transmit power control	Adaptive, varying between 25 dBm and -10 dBm according to modulation selected and radio path**
System gain	Integrated: Varies with modulation mode; up to 168 dBi with 23.5 dBi integrated antenna** Connectorized: Varies with modulation mode and antenna type**
Receiver sensitivity	Adaptive, varying between -96.0 dBm and -72 dBm according to modulation selected
Modulation	Dynamic; 8 modes adapting between BPSK and 64 QAM
Error correction	FEC, ARO
Duplex scheme	TDD ratio 50:50, 66:33; same or split frequency Tx/Rx
Antenna: type/gain/B/W	Integrated: Integrated flat plate 23 dBi / 7° Connectorized: Approved to operate with flat plate up to 28 dBi. Parabolic dish up to 37.7 dBi; connected via 2 x N-type female
Range	Up to 124 miles (200 km)***
Data rates	OS-Gemini: Up to 43 Mbps; dynamically variable with modulation range from 3.0 Mbps to 43 Mbps (aggregate) OS-Gemini Lite: Up to 21 Mbps; dynamically variable with modulation range from 1.5 Mbps to 21 Mbps (aggregate)
Security & encryption	Proprietary scrambling mechanism; optional AES 128 Bit Encryption * Regulatory conditions for RF bands should be confirmed prior to system purchase ** Gain and maximum transmit power may vary based on regulatory domain *** In all cases the range limit is set by the latest software release
ETHERNET BRIDGING	REMARKS
Protocol	IEEE 802.3
User data throughput	OS-Gemini: Dynamically variable up to 43 Mbps at the Ethernet (aggregate) OS-Gemini Lite: Dynamically variable up to 21 Mbps at the Ethernet (aggregate)
Packet prioritization	IEEE 802.1p
Interface	10 BASE-T / 100 BASE-T (RJ-45)–auto MDI/MDIX switching
Latency	Throughput Mode: Less than 7 mSec (default) Latency Mode: Less than 6 mSec
MANAGEMENT & INSTALLATION	REMARKS
LED indicators	Power status, Ethernet link status and activity
System management	Web Server and SNMP
Installation	Built-in audio assistance for link optimization
Connection	Distance between outdoor unit and primary network connection: up to 330' (100 meters)
PHYSICAL	REMARKS
Dimensions	Integrated outdoor unit (ODU): Width 14.5" (370 mm), Height 14.5" (370 mm), Depth 3.75" (95 mm) Connectorized ODU: Width 12" (305 mm), Height 12" (305 mm), Depth 4.1" (105 mm) Powered indoor unit (PIDU Plus): Width 9.75" (250 mm), Height 1.5" (40 mm), Depth 3" (80 mm)
Weight	Integrated ODU: 12.1 lbs (5.5 kg) including bracket Connectorized ODU: 9.1 lbs (4.3 kg) including bracket PIDU Plus: 1.9 lbs (864 g)
Wind speed	150 mph (242 kph)
Power supply	Integrated with Indoor Unit
Power source	90–240 VAC, 50–60 Hz / 36-60V DC
Power consumption	55 W max
ENVIRONMENTAL & REGULATORY	REMARKS
Operating temperature	-40°F (-40°C) to +140°F (+60°C), including solar radiation
Protection & safety	IP65/ UL60950; IEC60950; EN60950; CSA-C22.2 No. 60950
Radio	5.8 GHz: FCC Part 15, sub-part C 15.247, Eire ComReg 03/42, UK Approval to IR2007 5.4 GHz: EN 301 893
EMC	USA–FCC Part 15, Class B; Europe–EN 301 489-4



For more information about the Motorola Point-to-Point Solutions:

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Tech Support: +44 1364 655656

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www.orthogonsystems.com

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MOTOROLA OS-GEMINI DS US 13-Jun-06

formerly
Orthogon Systems
OS-Gemini